

Bernard P. Carvalho, Jr.
Mayor



Larry Dill, P.E.
County Engineer

Nadine K. Nakamura
Managing Director

Lyle Tabata
Deputy County Engineer

DEPARTMENT OF PUBLIC WORKS

County of Kaua'i, State of Hawai'i

4444 Rice Street, Suite 275, Lihu'e, Hawai'i 96766
TEL (808) 241-4992 FAX (808) 241-6604

April 8, 2014

Jessica Wooley, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu HI 96813

FILE COPY

APR 23 2014

OFFICE OF ENVIRONMENTAL
QUALITY CONTROL

14 APR -9 P2:31

RECEIVED

**SUBJECT: Draft Environmental Assessment for Kapahi Bridge Rehabilitation, TMK:
(4th) 4-6-04, Kawaihau District, County of Kaua'i, State of Hawaii**

Dear Ms. Wooley,

The County of Kaua'i, Department of Public Works (DPW) hereby transmits the Draft Environmental Assessment and anticipated finding of no significant impact (DEA-AFONSI) for the subject project for publication in the next available edition of the Environmental Notice.

Enclosed is a completed OEQC Publication form, one copy of the DEA-AFONSI, a CD with an Adobe Acrobat PDF file of the same and an electronic copy of the publication form in MS Word.

Please contact Kuppusamy Venkatesan at (808)241-4885 if you have any questions.

Very truly yours,


LARRY DILL, P.E.
County Engineer

MM/KV

Attach: As noted above

Cc: (w/o attach) Ron Terry, Ph.D., Project Environmental Consultant

**AGENCY ACTIONS
SECTION 343-5(B), HRS
PUBLICATION FORM (JULY 2012 REVISION)**

Project Name: Kapahi Bridge Rehabilitation
Island: Kaua'i
District: Kawaihau
TMK: (4th.): 4-6-04
Permits: Compliance with Chapter 343 and NEPA
National Pollutant Discharge Elimination System (NPDES)
Permit (potential); Community Noise Permit; Historic Sites
Review (Section 106 of NHPA and Chapter 6e, HRS);
Work in County Right-of-Way; Subdivision Approval;
Grading, Grubbing, Excavating and Stockpiling Permits

Proposing/Determination Agency: County of Kaua'i, Department of Public Works
(Address, Contact Person, Telephone)

Kuppusamy Venkatesan
4444 Rice Street, Suite 275
Līhu'e, Hawai'i 96766
808-241-4885

Consultant:
(Address, Contact Person, Telephone)

Geometrician Associates
PO Box 386
Hilo HI 96721
(808) 969-7090
rterry@hawaii.rr.com

Status (check one only):

- DEA-AFNSI** Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of DEA, a completed OEQC publication form, along with an electronic word processing summary and a PDF copy (you may send both summary and PDF to oeqchawaii@doh.hawaii.gov); a 30-day comment period ensues upon publication in the periodic bulletin.
- FEA-FONSI** Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of the FEA, an OEQC publication form, along with an electronic word processing summary and a PDF copy (send both summary and PDF to oeqchawaii@doh.hawaii.gov); no comment period ensues upon publication in the periodic bulletin.
- FEA-EISPN** Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of the FEA, an OEQC publication form, along with an electronic word processing summary and PDF copy (you may send both summary and PDF to oeqchawaii@doh.hawaii.gov); a 30-day consultation period ensues upon publication in the periodic bulletin.
- Act 172-12 EISPN** Submit the proposing agency notice of determination on agency letterhead, an OEQC publication form, and an electronic word processing summary (you may send the summary to oeqchawaii@doh.hawaii.gov). NO environmental assessment is required and a 30-day consultation period upon publication in the periodic bulletin.
- DEIS** The proposing agency simultaneously transmits to both the OEQC and the accepting authority, a hard copy of the DEIS, a completed OEQC publication form, a distribution list, along with an electronic word processing summary and PDF copy of the DEIS (you may send both the summary and PDF to oeqchawaii@doh.hawaii.gov); a 45-day comment period ensues upon publication in the periodic bulletin.
- FEIS** The proposing agency simultaneously transmits to both the OEQC and the accepting authority, a hard copy of the FEIS, a completed OEQC publication form, a distribution list, along with an electronic word processing summary and PDF copy of the FEIS (you may send both the summary and PDF to oeqchawaii@doh.hawaii.gov); no comment period ensues upon publication in the periodic bulletin.
- Section 11-200-23**

*14 APR -9 P2:31
Permitting

Determination

The accepting authority simultaneously transmits its determination of acceptance or nonacceptance (pursuant to Section 11-200-23, HAR) of the FEIS to both OEQC and the proposing agency. No comment period ensues upon publication in the periodic bulletin.

___ Section 11-200-27
Determination

The accepting authority simultaneously transmits its notice to both the proposing agency and the OEQC that it has reviewed (pursuant to Section 11-200-27, HAR) the previously accepted FEIS and determines that a supplemental EIS is not required. No EA is required and no comment period ensues upon publication in the periodic bulletin.

___ Withdrawal (explain)

Summary (Provide proposed action and purpose/need in less than 200 words. Please keep the summary brief and on this one page):

The project involves the rehabilitation of a bridge that crosses Kapa'a Stream on Kawaihau Road, between Moalepe and Kahuna Roads. Built in about 1937 to replace a 1907 structure, everything but the bridge abutments for Kapahi Bridge have been replaced since that time. It is a steel stringer/multi-beam bridge with a single 36-foot span and a total length of 38 feet. It also supports water lines. The bridge has damaged timber posts and railings, corroded girders, undermined abutments, and an unsupported guardrail. It is now posted to limit loads to just three tons, which means that school buses, fire trucks, and many other large vehicles cannot cross it. This causes ongoing detours and associated inconvenience and expense. The project will replace the deck and railings, provide additional abutments, and add safety markings for pedestrians and bicycles. The purpose is to provide a safe bridge that accommodates any legal weight of truck or bus, maximizes safety for motor vehicles, pedestrians and bicycles, is practical to maintain in an adequate condition, and preserves the historic integrity and character of the bridge to the greatest practical degree.

KAPAHI BRIDGE REHABILITATION DRAFT ENVIRONMENTAL ASSESSMENT

TMK (4th): 4-6-04
Kawaihau District, County of Kaua‘i, State of Hawai‘i

Submitted Pursuant to Chapter 343, Hawai‘i Revised Statutes (HRS)

April 2014



Prepared for:

County of Kaua‘i
Department of Public Works
4444 Rice Street, Suite 275
Lihu‘e, Hawai‘i 96766

Prepared by:

Geometrician Associates
PO Box 396
Hilo, Hawai‘i 96721

and KAI Hawaii
31 N. Pauahi St., 2nd Floor
Honolulu, Hawai‘i 96817

KAPAHI BRIDGE REHABILITATION
DRAFT ENVIRONMENTAL ASSESSMENT

TMK (4th): 4-6-04
Kawaihau District, County of Kaua‘i, State of Hawai‘i

Submitted Pursuant to Chapter 343, Hawai‘i Revised Statutes (HRS)
County of Kaua‘i, Department of Public Works

Prepared for

County Of Kaua‘i
Department of Public Works



Prepared by:
Geometrician Associates and KAI Hawaii

[this page intentionally left blank]

TABLE OF CONTENTS

PREFACE AND SUMMARY	iii
PART 1: PROJECT DESCRIPTION, PURPOSE AND NEED AND E.A. PROCESS .	1
1.1 Project Location and Description of Existing Bridge	1
1.2 Purpose and Need	1
1.3 Environmental Assessment Process.....	11
1.4 Public Involvement and Agency Coordination	12
PART 2: ALTERNATIVES.....	13
2.1 No Action	13
2.2 Proposed Action	13
2.3 Alternatives Evaluated and Dismissed from Further Consideration.....	14
2.3.1 Repair Bridge Leaving Design Elements in Place.....	14
2.3.2 Build on New Location Without Using Existing Bridge.....	14
PART 3: ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION	15
3.1 Physical Environment.....	15
3.1.1 Climate, Geology, Soils and Geologic Hazard	15
3.1.2 Streams, Drainage, Water Quality and Waters of the U.S.....	16
3.1.3 Flora, Fauna, and Ecosystems	21
3.1.4 Air Quality, Noise and Scenic Resources	25
3.1.5 Hazardous Substances, Toxic Materials and Hazardous Conditions....	26
3.2 Socioeconomic and Cultural	27
3.2.1 Socioeconomic Characteristics	27
3.2.2 Public Services.....	27
3.2.3 Cultural Resources.....	29
3.2.4 Archaeology and Historic Sites	32
3.3 Infrastructure	36
3.3.1 Utilities.....	36
3.3.2 Traffic	36
3.4 Secondary and Cumulative Impacts.....	37
3.5 Required Permits and Approvals	37
3.6 Consistency with Laws, Plans and Policies	38
3.6.1 Hawai‘i State Plan.....	38
3.6.2 Hawai‘i State Land Use Law	38
3.6.3 Kaua‘i General Plan and Zoning	38
3.7 Federal Laws and Executive Orders	39
3.7.1 Coastal Zone Management Act Consistency and Coastal Barriers	39
3.7.2 Clean Water Act, as Amended (33 USC 1251 et seq.).....	40
3.7.3 Clean Air Act As Amended (42 USC 7401, et seq.)	41
3.7.4 Wild and Scenic Rivers Act (16 U.S.C. 1271-1287)	41
3.7.5 Farmland Protection Policy Act (7 U.S.C. 4201, et seq.).....	41
3.7.6 Resource Conservation and Recovery Act (42 USC 6901 et seq.)	42
3.7.7 Executive Order 11988, Floodplain Management (24 May 1977)	43
3.7.8 Executive Order 11990, Protection of Wetlands (24 May 1977)	43
3.7.9 Executive Order 12898, Environmental Justice	43
3.7.10 National Historic Preservation Act (16 U.S.C. 470)	44

3.7.11 Section 4(f)	44
3.7.12 Endangered Species Act (16 USC 1531-1544) and Related Laws	45
PART 4: DETERMINATION	45
PART 5: FINDINGS AND REASONS	45
REFERENCES	47

LIST OF FIGURES

FIGURE 1 USGS Map	2
FIGURE 2 TMK Map	3
FIGURE 3 Aerial Image.....	4
FIGURE 4 Project Site Photos	5
FIGURE 5a Site Plan Bridge Layout.....	7
FIGURE 5b Site Plan Abutment Demolition Plan.....	8
FIGURE 5c Site Plan Longitudinal Section.....	9
FIGURE 5d Site Plan Cross Section	9
FIGURE 6 Flood Insurance Rate Map of Project Site	18
FIGURE 7 Area of Potential Effect to Historic Properties	33
FIGURE 8 Agricultural Lands of Importance in Project Area	42

LIST OF TABLES

TABLE 1 Selected Socioeconomic Characteristics.....	28
TABLE 2 Permits and Approvals.....	37

APPENDIX 1a	Comments in Response to Early Consultation and Related Correspondence
APPENDIX 1b	Public Involvement Documentation
APPENDIX 2	Archaeological Inventory Survey and Section 106 Correspondence
APPENDIX 3	Water Quality and Biological Report
APPENDIX 4	Cultural Impact Assessment

PREFACE

This Draft Environmental Assessment (EA) has been prepared pursuant to Chapter 343, Hawai‘i Revised Statutes (HRS), and Title 11, Chapter 200, Hawai‘i Administrative Rules (HAR). The County of Kaua‘i Department of Public Works (DPW) proposes to rehabilitate Kapahi Bridge in the Kawaihau District, Island of Kaua‘i.

This EA assesses the potential impacts of the project. It is required since County funds will be used for the design and construction of the proposed improvements, which occur on County lands. A Finding of No Significant Impact (FONSI) is anticipated.

In addition to County funds, Federal Highway Administration (FHWA) funds will be used for the design and construction of the project. Separate environmental documentation is being prepared to satisfy the requirements of the National Environmental Policy Act (NEPA) of 1969, as amended, (Pub. L. 91-190, 42 U.S. Code 4321-4347), Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA, (40 Code of Federal Regulations 1500-1508), and 23 Code of Federal Regulations Part 771, Environmental Impact and Related Procedures.

SUMMARY OF PROJECT

PROJECT NAME:	Kapahi Bridge Rehabilitation
PROPOSING/ APPROVING AGENCY:	County of Kaua‘i Department of Public Works 4444 Rice Street, Suite 275 Līhu‘e, Kaua‘i, Hawai‘i 96766-1340
LOCATION:	
TAX MAP KEY & LAND OWNERSHIP:	(4 th) 4-6-04
CLASS OF ACTION	Use of County lands and funds
PROPOSED ACTION:	Rehabilitation of Kapahi Bridge by replacing deck and railings, providing additional abutments, and adding safety markings for pedestrians and bicycles.
PURPOSE:	Provide a safe bridge that supports any legal weight bus or truck, maximizes safety for motor vehicles, pedestrians and bicycles, is practical to maintain in an adequate condition, and preserves the historic integrity and character of the bridge to the greatest practical degree.

STATE LAND USE DISTRICT:	Agricultural
ZONING:	Agriculture District (A)
COUNTY GENERAL PLAN:	Agriculture
PERMITS REQUIRED:	<p><i>State of Hawai‘i Department of Health</i></p> <ul style="list-style-type: none"> • Community Noise Permit • National Pollutant Discharge Elimination System (NPDES) Permit (potential) <p><i>Department of Land and Natural Resources, Historic Preservation Division</i></p> <ul style="list-style-type: none"> • Concurrence with Chapter 6E, HRS Historic Preservation, and Section 106 National Historic Preservation Act <p><i>County of Kaua‘i Department of Public Works</i></p> <ul style="list-style-type: none"> • Grubbing and Grading Permit and Road Permit <p><i>County of Kaua‘i Planning Department</i></p> <ul style="list-style-type: none"> • Subdivision Permit (potential)
ACCEPTING AUTHORITY:	County of Kauai, Director of Department of Public Works
DETERMINATION:	Anticipated FONSI

PART 1: PROJECT DESCRIPTION, PURPOSE AND NEED AND ENVIRONMENTAL ASSESSMENT PROCESS

1.1 Project Location and Description of Existing Bridge

The project involves the rehabilitation of Kapahi Bridge (Figures 1-4). The bridge crosses Kapa‘a Stream on Kawaihau Road, between Moalepe and Kahuna Roads. Built in about 1937 to replace a 1907 structure, everything but the bridge abutments have been replaced since that time. The bridge has a steel stringer/multi-beam, single 36-foot span, with a total length of 38 feet. The bridge also supports water lines.

1.2 Purpose and Need

The Need for the replacement/rehabilitation of the Kapahi Bridge is based on the following factors (see Figures 4a-d for photographs that document the bridge’s conditions).

- The bridge has damaged timber posts and railings, corroded girders, undermined abutments, and an unsupported guardrail.
- A tree that fell during the severe storm of March 2012 caused further bridge damage.
- The bridge is currently posted to limit loads to just three tons, which means that school buses, fire trucks, and many other large vehicles cannot cross it, which causes ongoing detours and associated inconvenience and expense.
- If major repairs are not conducted, the County will be forced for safety reasons to close the bridge, leading to serious inconveniences involving permanent detours of up to 3.5 miles for residents and businesses.

While the Need for the project describes the deficiencies, the project Purpose defines the problem to be solved. Defining the Purpose is necessary to determine the range of alternatives to be considered; each alternative must meet the Purpose and address the identified Need to be considered a viable solution.

The Purpose of the Kapahi Bridge replacement/rehabilitation project has five elements:

- Design and build a safe bridge that supports any legal weight bus or truck
- Improve approaches to the bridge to maximize safety for motor vehicles, pedestrians and bicycles
- Provide a design that is practical to maintain in an adequate condition in the future
- Replace and/or relocate water lines
- Preserve the historic integrity and character of the bridge to the greatest practical degree

Figure 2: TMK Map

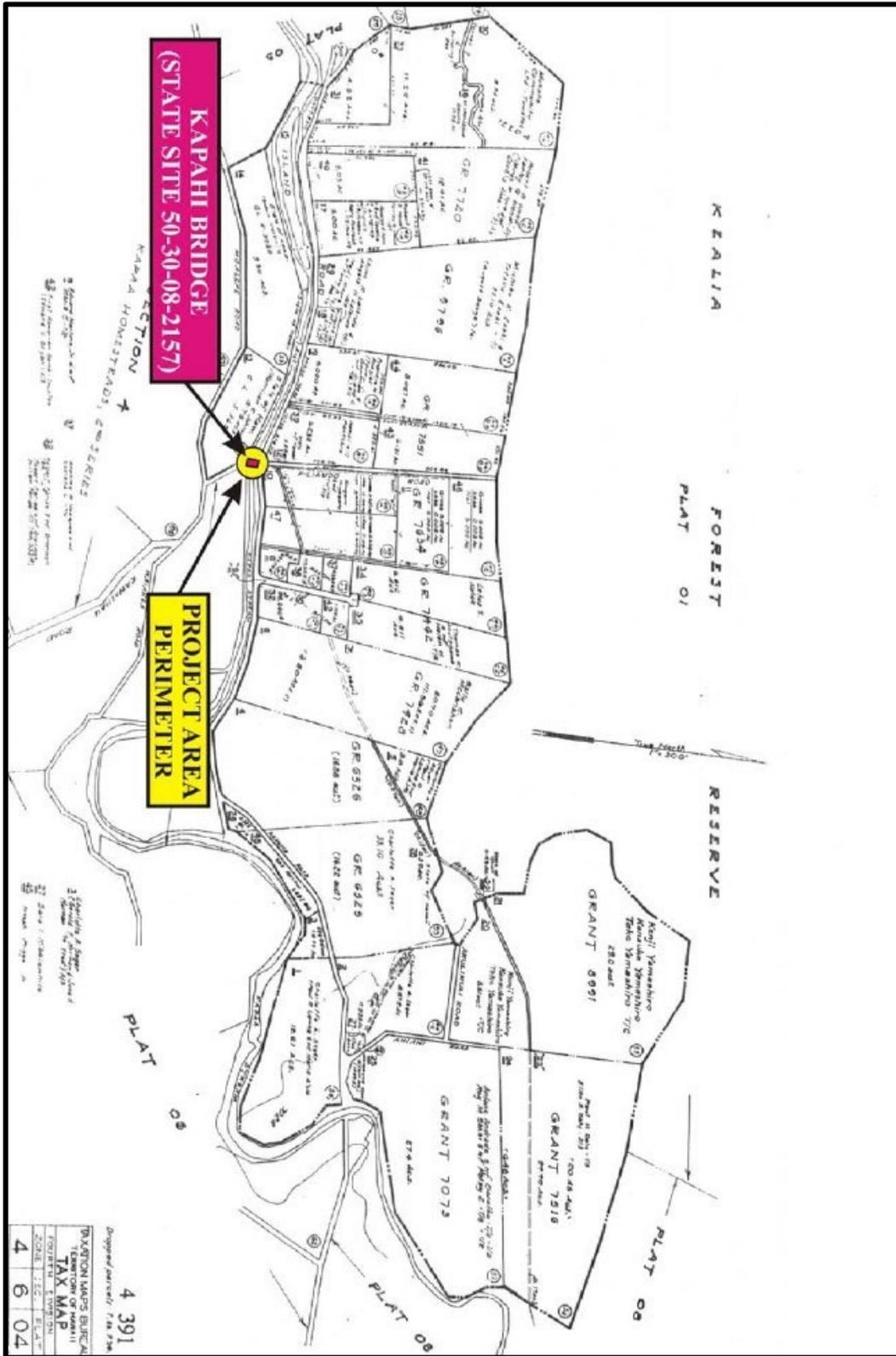


Figure 3: Aerial Image



Figure 4: Project Site Photos



Figure 4a: Kapahi Bridge from Downstream ▲ ▼ Figure 4b Side Approach to Bridge

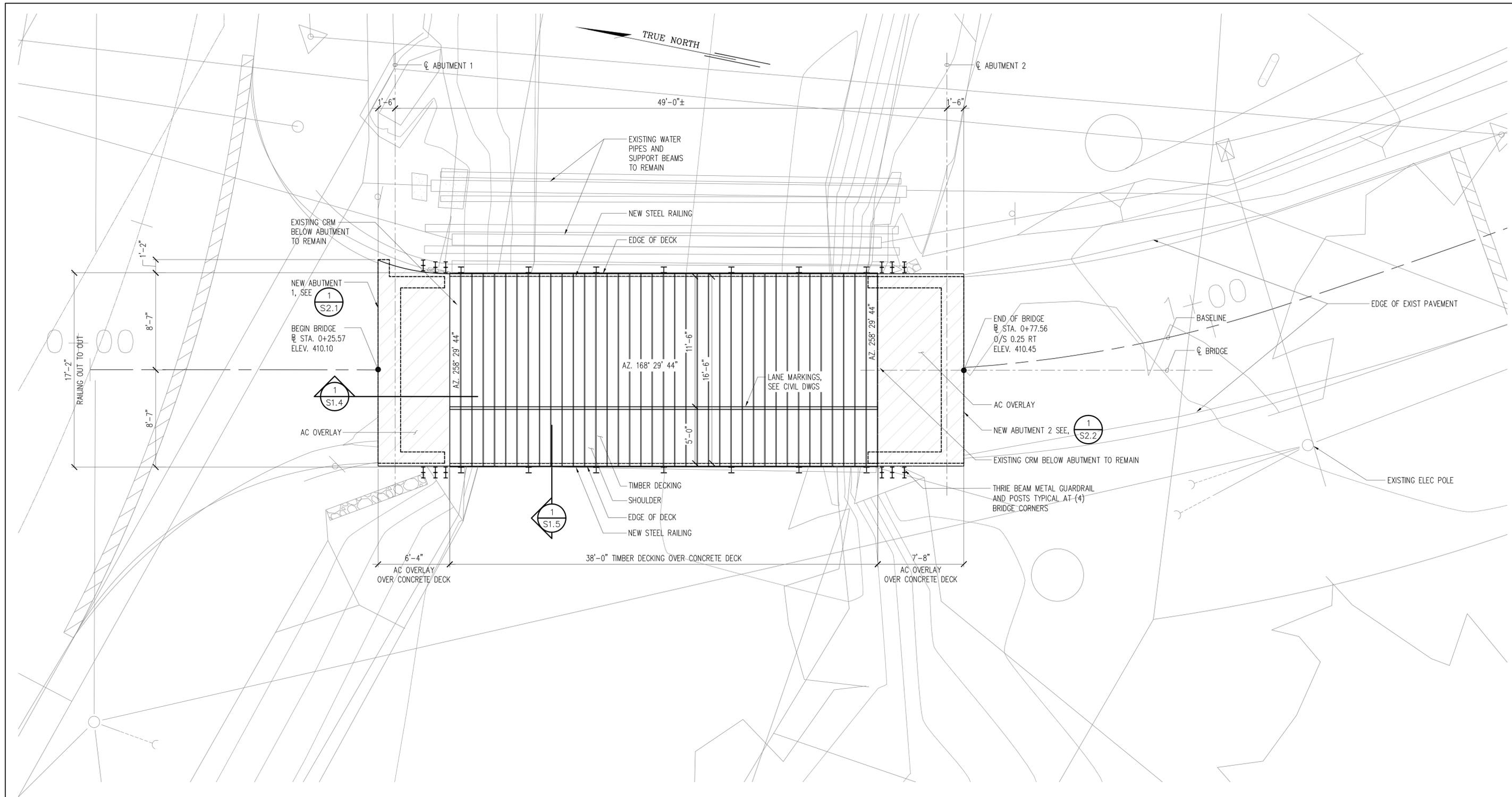


Figure 4: Project Site Photos



Figure 4c: South Approach to Bridge ▲ ▼ Figure 4d: Damage from 2013 Flooding



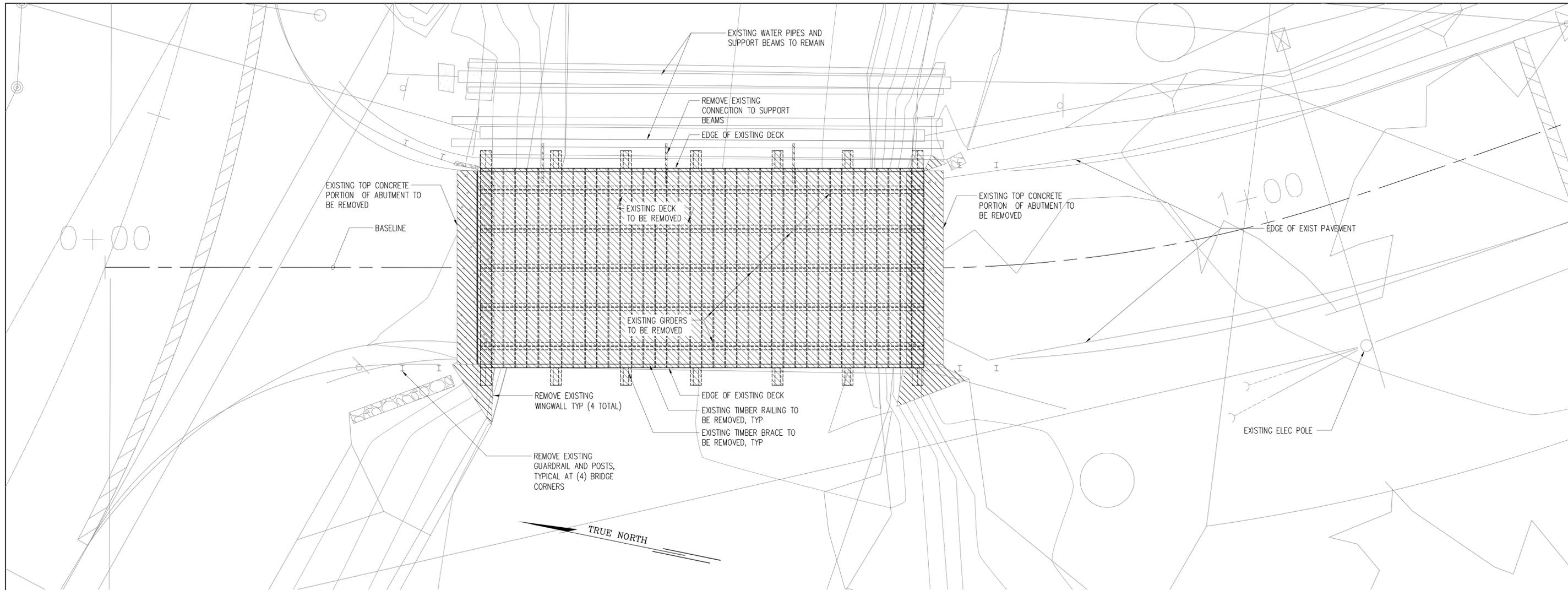


1 BRIDGE LAYOUT PLAN

SCALE: 1/4" = 1'-0"

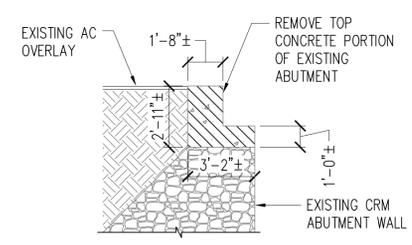
COUNTY OF KAUAI DEPARTMENT OF PUBLIC WORKS			
KAPAHU BRIDGE REPAIR/REPLACEMENT KAUAI, HAWAII Federal Aid Project No. BR-0700(53) BRIDGE LAYOUT PLAN			
SCALE: AS SHOWN	DATE: MARCH, 2014		
DRAWN BY: BC	F.B. X	C.B. X	MAP NO. 1000
TRACED BY:	CHECKED BY: MH	SHEET 9	
APPROVED: _____		COUNTY ENGINEER	
EXPIRATION DATE OF THE LICENSE 4/30/2016 THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION		S0.4 OF 24 SHEETS	

TMK (4) 4-6-004 ROAD

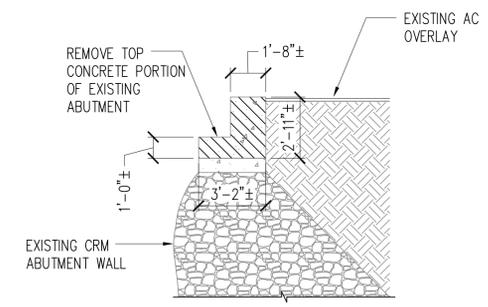


LEGEND:
 ITEM TO BE REMOVED/DEMOLISHED

1 EXISTING BRIDGE DEMOLITION PLAN
 SO.3 SCALE: 1/4" = 1'-0"



2 EXISTING ABUTMENT 1 SECTION
 SO.3 SCALE: 3/4" = 1'-0"



3 EXISTING ABUTMENT 2 SECTION
 SO.3 SCALE: 3/4" = 1'-0"

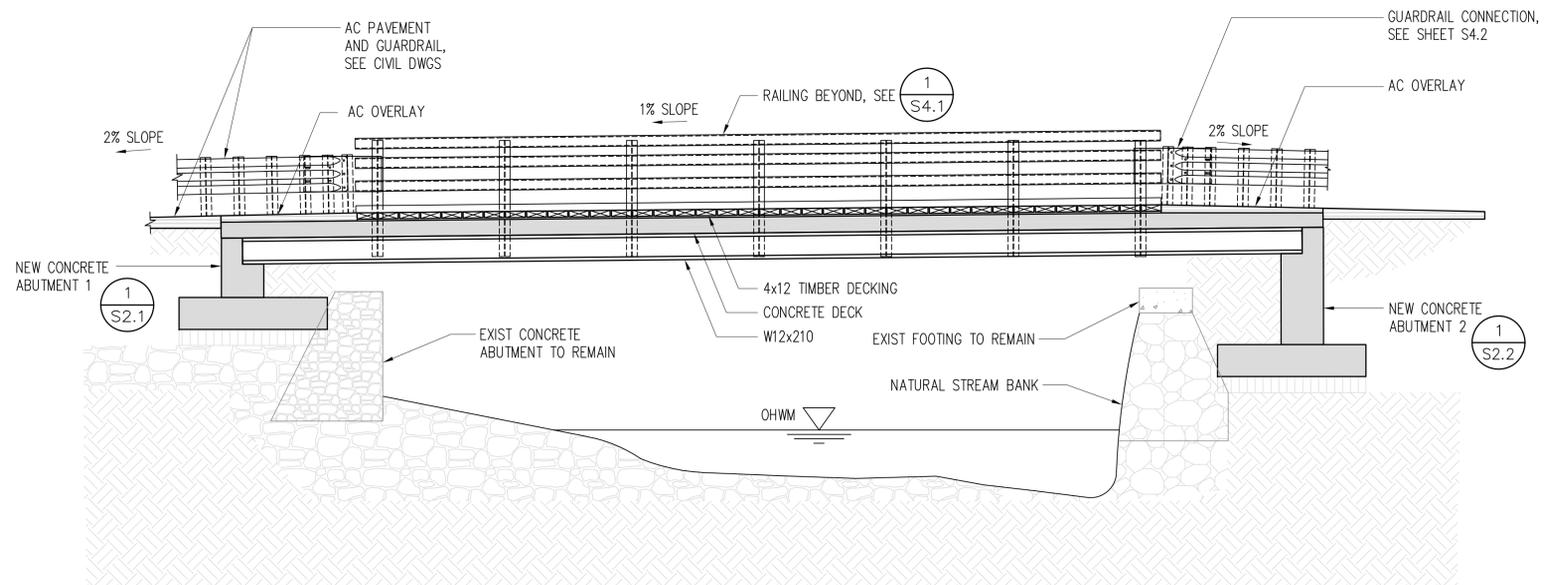
- NOTES:**
1. THE REMAINING PORTION OF THE NORTH ABUTMENT WALL SHALL BE BELOW ELEV. 407.52
 2. THE REMAINING PORTION OF THE SOUTH ABUTMENT WALL SHALL BE BELOW ELEV. 407.92

COUNTY OF KAUAI
 DEPARTMENT OF PUBLIC WORKS
KAPAHI BRIDGE REPAIR/REPLACEMENT
 KAUAI, HAWAII
 Federal Aid Project No. BR-0700(53)
EXISTING ABUTMENT DEMOLITION PLAN

SCALE: AS SHOWN	DATE: MARCH, 2014
DRAWN BY: BC	F.B. C.B. X X
TRACED BY: MH	MAP NO. 1000
CHECKED BY: MH	SHEET 8
APPROVED: _____	COUNTY ENGINEER

EXPIRATION DATE OF THE LICENSE 4/30/2016
 THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

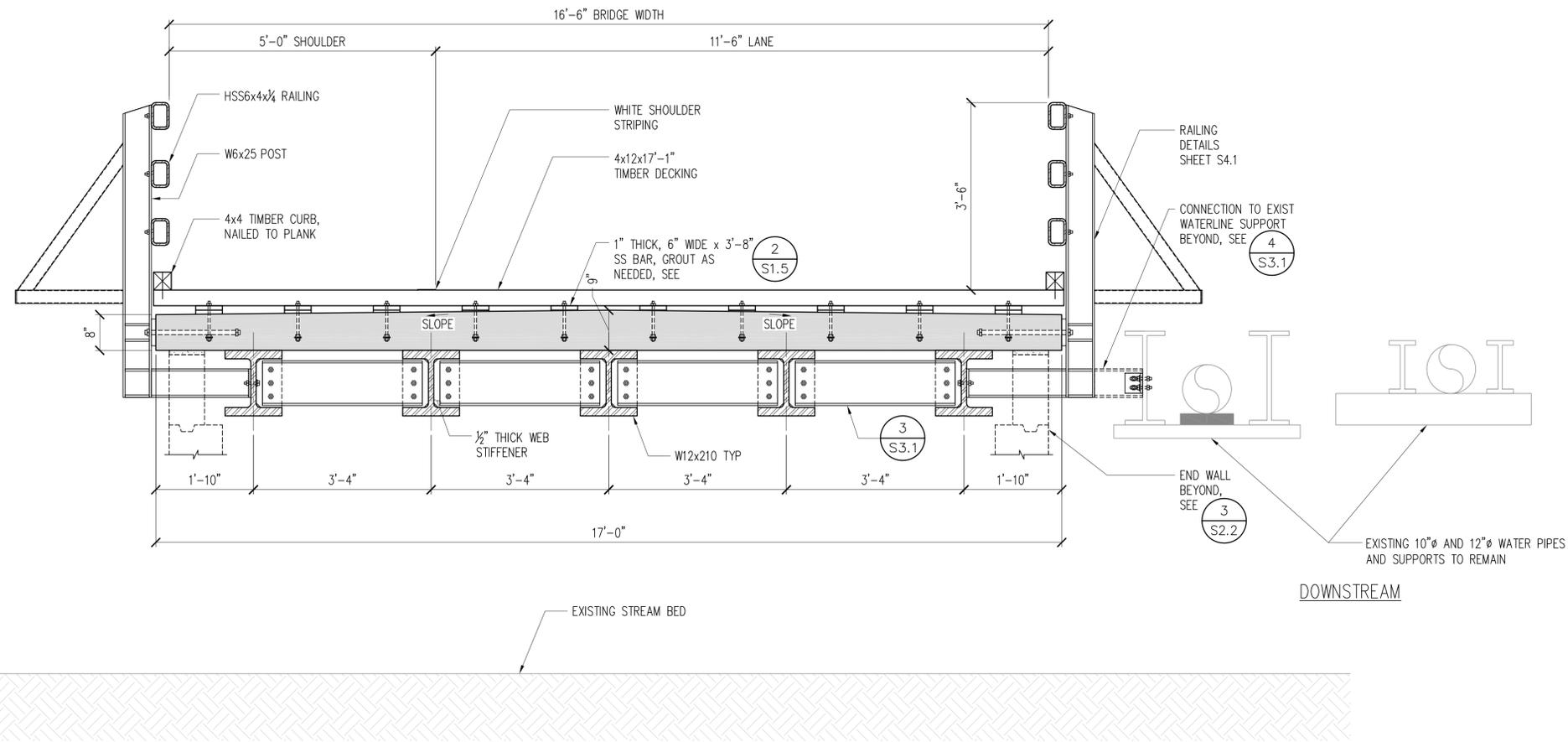
S0.3
 OF 24 SHEETS



1
S1.4 TYPICAL LONGITUDINAL SECTION
SCALE: 1/4" = 1'-0"

COUNTY OF KAUAI DEPARTMENT OF PUBLIC WORKS			
KAPAHU BRIDGE REPAIR/REPLACEMENT KAUAI, HAWAII Federal Aid Project No. BR-0700(53) TYPICAL LONGITUDINAL SECTION			
SCALE: AS SHOWN	DATE: MARCH, 2014		
DRAWN BY: BC	F.B. X	C.B. X	MAP NO. 1000
TRACED BY:			SHEET 13
CHECKED BY: MH			S1.4
APPROVED _____	COUNTY ENGINEER	OF 24	SHEETS

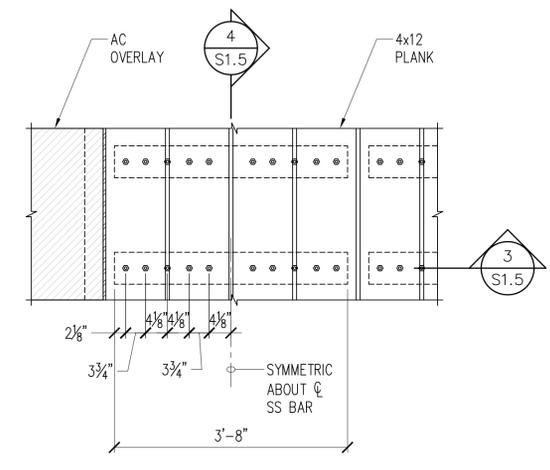
EXPIRATION DATE OF THE LICENSE 4/30/2016
THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION



UPSTREAM

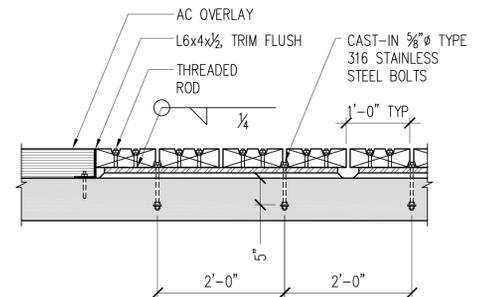
DOWNSTREAM

EXISTING STREAM BED



2
S1.5 **STEEL BAR DETAIL**
SCALE: 3/4" = 1'-0"

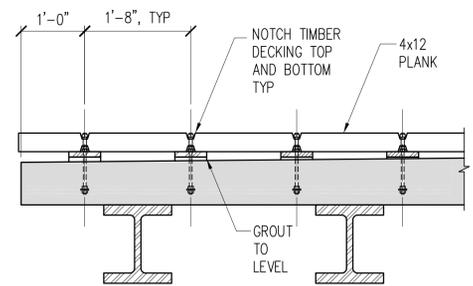
NOTE:
1. POSITION BOLTS TO NOT INTERSECT WITH DECK REINFORCEMENT



3
S1.5 **DECK SECTION**
SCALE: 3/4" = 1'-0"

1
S1.5 **TYPICAL DECK SECTION**
SCALE: 3/4" = 1'-0"

NOTE:
1. NOTCH PLANKS SUCH THAT BOLTS DO NOT PROTRUDE ABOVE ROADWAY, AND PLANKS REST FLAT ONTO STAINLESS STEEL BAR



4
S1.5 **DECK SECTION**
SCALE: 3/4" = 1'-0"

NOTE:
1. PAINT 4x4 TIMBER CURB WHITE, TYPICAL, NAILED WITH 6" LONG NAILS AT $\frac{1}{2}$ OF EVERY OTHER PLANK

COUNTY OF KAUAI DEPARTMENT OF PUBLIC WORKS			
KAPAHU BRIDGE REPAIR/REPLACEMENT KAUAI, HAWAII Federal Aid Project No. BR-0700(53) TYPICAL BRIDGE CROSS SECTION AND DETAILS			
SCALE: AS SHOWN	DATE: MARCH, 2014		
DRAWN BY: BC	F.B. X	C.B. X	MAP NO. 1000
TRACED BY:			SHEET 14
CHECKED BY: MH			S1.5
APPROVED: _____	COUNTY ENGINEER	OF 24	SHEETS

EXPIRATION DATE OF THE LICENSE 4/30/2016
THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION

1.3 Environmental Assessment Process

This Draft Environmental Assessment (EA) assesses the potential impacts of the project. This EA is required because County of Kaua‘i funds will be used for the design and construction of the proposed improvements, which occur on County lands. Chapter 343 of the Hawai‘i Revised Statutes (HRS) is the basis for the environmental impact process in the State of Hawai‘i. The content requirements and procedures are specified by Chapter 343, HRS, and its implementing regulations, Title 11, Chapter 200, of the Hawai‘i Administrative Rules (HAR).

An EA is prepared to document the consequences of a proposed action and determine whether the action would produce significant impacts. When an EA supports a Finding of No Significant Impact (FONSI), the EA and its associated FONSI satisfy the proponent’s need to comply with Chapter 343, HRS. When the EA does not support a FONSI, the EA facilitates preparation of an Environmental Impact Statement (EIS). Therefore, if the Approving Agency (in this case, DPW) concludes that no significant impacts would occur from implementation of the proposed action, a FONSI will be prepared and the action will be permitted to occur. If the Approving Agency finds that significant impacts are expected to occur as a result of the proposed action, then an EIS will be prepared. At the present time, a FONSI is anticipated for the project. Part 5 of this EA lists these criteria and DPW’s findings regarding significance.

In addition to County funds, U.S. Department of Transportation, Federal Highway Administration (FHWA) funds will be used for the design and construction of the project. Separate environmental documentation is being prepared to satisfy the requirements of the National Environmental Policy Act (NEPA) of 1969, as amended, (Pub. L. 91-190, 42 U.S. Code 4321-4347), Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA, (40 Code of Federal Regulations 1500-1508), and 23 Code of Federal Regulations Part 771, Environmental Impact and Related Procedures.

The NEPA environmental documentation process will also address the requirements of Section 106 of the National Historic Preservation Act, as amended, as well as the law commonly known as Section 4(f) (49 U.S.C. §303 and 23 U.S.C. §138 implemented by FHWA through regulation 23 CFR 774), established to require consideration of park and recreational lands, wildlife and waterfowl refuges, and historic sites in transportation project development. Because the issue of successfully resolving historic preservation issues has been central to the design of the bridge rehabilitation, FHWA and its designees, the Hawai‘i Department of Transportation (HDOT) and DPW, have been actively engaging in Section 106 consultation with the State Historic Preservation Division, the Historic Hawai‘i Foundation, the Kaua‘i Historic Preservation Review Commission, Native Hawaiian organizations, and the community. For the purposes of this EA, historic preservation concerns related to the National Historic Preservation Act and Chapter 6e, HRS, “Historic Preservation”, will not be distinguished, although it is recognized that there are separate processes with their own procedures.

1.4 Public Involvement and Agency Coordination

The following agencies and organizations were consulted through early consultation letters as part of the development of the EA.

Federal:

- U.S. Army Corps of Engineers
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- U.S. Natural Resources Conservation Service

State:

- Department of Health, Environmental Planning Office
- Department of Land and Natural Resources, Division of Forestry and Wildlife
- Department of Land and Natural Resources, State Historic Preservation Division
- Department of Land and Natural Resources, Office of the Chairperson
- Department of Land and Natural Resources, Division of Aquatic Resources
- Department of Land and Natural Resources, Land Division
- Department of Land and Natural Resources, Engineering Division
- Department of Land and Natural Resources, Commission on Water Resources Mgmt.
- Office of Hawaiian Affairs

County:

- Planning Department
- Department of Public Works
- Fire Department
- Police Department
- County Council
- Civil Defense

Private:

- Wailua-Kapa‘a Neighborhood Association
- Kaua‘i County Historic Preservation Review Commission
- Historic Hawai‘i Foundation

Copies of written communications received during early consultation are contained in Appendix 1a.

The County of Kaua‘i held a series of publicly advertised meetings concerning this bridge rehabilitation project and two others in December 2011, April 2012 and November 2013. Minutes and sign-in sheets are provided in Appendix 1b. At the first meeting, the balance between improving safety and preserving the historic character of the bridge was identified as the primary issue. Subsequent meetings focused on modifying the design to accomplish this element of the purpose. A series of meetings was also held with the Kaua‘i County Historic Preservation Review Commission (KHPRC), the State Historic Preservation Division (SHPD) and the Historic

Hawai‘i Foundation (HHF) to receive periodic input on the success of the designs in achieving historic preservation goals.

The County of Kaua‘i welcomes comments on the proposed project, which may be submitted during the 30-day public comment period specified in the *OEQC Environmental Notice* that announces the availability of this EA and provides instructions for submitting comments.

PART 2: ALTERNATIVES

This section discusses the alternatives that have been considered in the EA, including no action and the proposed action, as well as alternatives that have been evaluated but dismissed from further consideration because they do not adequately and efficiently address the purpose and need of the project discussed in Section 1.2.

2.1 No Action

The No Action Alternative is the baseline against which the proposed action alternative is compared. Under the No Action Alternative, the bridge rehabilitation would not be implemented. The No Action Alternative would not correct the situation that causes the bridge to be considered structurally deficient and deteriorated and unable to carry loads over three tons. The damaged timber posts and railings, corroded girders, undermined abutments, and an unsupported guardrail would be not fully repaired or replaced. School buses, fire trucks, and many other large vehicles would continue to face detours and associated inconvenience and expense. Engineers have determined that normal maintenance would not be adequate to cope with the situation. Furthermore, these deficiencies may lead to sudden collapse and potential injury or loss of life and closure of the bridge for an undetermined length of time. The No Action Alternative is considered unacceptable by the lead agencies because these conditions pose serious and unacceptable safety hazards to the residents of the Kapahi area, as well as visitors, farms, ranches, and businesses and emergency service providers, placing an intolerable restriction on transport and travel.

2.2 Proposed Action

The proposed action consists of structural and safety improvements that retain the bridge’s original size and basic appearance (See Figure 5).

First, new concrete abutments will be created behind the existing abutments to provide the structural support the bridge requires. The existing abutments, which face the stream banks, will remain, meaning that there will be no need to alter the stream bank and the appearance near the stream will not change. There will be a new concrete deck to replace the existing steel beams, which will rest on a girder that will be extended to the new abutments and hidden behind an end wall to retain the existing appearance. Timber deck planks in the same pattern and size as the existing decking will be placed above concrete deck, with spacers to allow for drainage and for the wood to breathe. The deck will be extended with asphalt paving. The new deck system strong enough to carry any emergency vehicle of current size/weight classes, and will be rated to support any legal weight bus or truck. A five-foot wide sidewalk delineated by striping will be present on the downstream side. For bicycle safety, the

deck will be marked with a bicycle “sharrow” symbol (see Figure 5c) on both approaches to indicate a shared lane and promote driver awareness.

Steel crash-tested railings that resemble wood railings will be installed and painted white to match the existing appearance. The existing water pipes and supports that are suspended on the bridge will remain. Existing guardrails at both approaches will be replaced by three-beam transition guardrails.

2.3 Alternatives Evaluated but Dismissed from Further Consideration

Various alternative designs or strategies were examined that had at least some potential to address and satisfy some or all of the needs and purposes of the project.

2.3.1 Repair Bridge Leaving Design Elements in Place

Engineers have determined that normal maintenance cannot cope with the present state of deterioration and that the timber posts and railings, corroded girders, undermined abutments, and an unsupported guardrail are damaged beyond the ability to repair or replace on a part by part basis.

2.3.2 Build on New Location Without Using Existing Bridge

An alternative to replacing or reconstructing Kapahi Bridge was to construct a new bridge on a new location parallel to the old bridge. Because of the existing road geometry, land use and ownership, the only practical location would be directly adjacent to the existing bridge. The advantage of this alternative is that it could completely preserve the bridge intact without altering any of its character, and the bridge could also be used for pedestrians. However, even for pedestrian use it would require some structural repairs, and maintenance would continue to be an issue, especially after stream flooding. Although the bridge itself would appear identical, the presence of a modern bridge directly adjacent would detract from its appearance. Private land would need to be acquired through purchase or even condemnation to allow this action, adding to the considerable costs. The County of Kaua‘i considered this but determined that the advantages were outweighed by the substantial disadvantages, and dismissed this alternative from further consideration.

PART 3: ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION MEASURES

The project involves the rehabilitation of Kapahi Bridge, which crosses Kapa‘a Stream on Kawaihau Road, between Moalepe and Kahuna Roads. (see Figures 1-4). The bridge and the immediately surrounding area are referred to throughout this EA as the *project site*. The term *project area* is used flexibly to describe the general environs of Kapahi, the Kawaihau District, and in some cases, the entire island of Kaua‘i.

3.1 Physical Environment

3.1.1 Climate, Geology, Soils and Geologic Hazards

Environmental Setting

The average maximum daily temperature is approximately 80 degrees F., with an average minimum of 67 degrees, and annual rainfall averages approximately 80 inches (Giambelluca et al 2011). Rainfall is highly variable and storms can produce significant rainfall in short periods of times, which can cause Kapa‘a Stream to rise rapidly.

Kaua‘i, the oldest and fourth largest of the eight main Hawaiian Islands, was formed from one great shield volcano (Macdonald and Abbott 1970:458-461). At one time, this vast volcano supported the largest caldera in the islands, horizontally extending 10 to 14 miles across. Mount Wai‘ale‘ale, which forms the central hub of the island, rises to 5,148 feet above sea level. Topographically, Kaua‘i is a product of heavy erosion with broad, deep valleys, and large alluvial plains.

The project site is about 370 feet above sea level. Geologically, the surface of the project site is composed of late Pliocene and Pleistocene-era lava flows from the Kōloa Volcanic Series (Sherrod et al 2007). The project site soil is classified by the U.S. Natural Resources Conservation Service (formerly Soil Conservation Service) as Kapaa silty clay (KkB) (Foote et al 2972). The Kapaa Series consists primarily of alluvial-washed silty clays. These well-drained soils of Kaua‘i’s uplands occur on gentle to extreme slopes. The KkB soils exhibit moderate permeability, slow runoff, and a slight erosion hazard.

The entire Island of Kaua‘i is rated Zone 1 Seismic Hazard. Zone 1 areas have a low chance of experiencing severe shaking in any given 50-year period (<http://hvo.wr.usgs.gov/earthquakes/hazards/>). The Island of Kaua‘i is rated within the lowest seismic hazard zone by the Uniform Building Code (Uniform Building Code, 1997 Edition, Figure 16-2). The project site does not appear to be at major risk of subsidence, landslides or other forms of mass wasting, although stream banks are inherently unstable and require geotechnical investigations for all footings and other foundation work.

The Agricultural Lands of Importance in the State of Hawai‘i (ALISH), prepared by the State Department of Agriculture, classifies lands into three categories: 1) Prime Agricultural Land, (2) Unique Agricultural Land, and (3) Other Important Agricultural Land. According to maps, the project site is mapped within Prime Agricultural Land (refer to Section 3.7.5 for a discussion of the project’s compliance with the Farmland Protection Policy Act).

Impacts and Mitigation Measures

Project design would take soil properties into account through geotechnical investigations, and the bridge will be built in conformance with the Uniform Building Code's seismic standards.

Special Contract Requirements incorporated into the construction contract documents will stipulate that in the event that a previously undetected lava tube is breached during construction, particularly during excavation for the new abutments, DPW will notify the State Historic Preservation Division and immediately cease work in the vicinity, in order to allow determination of whether human remains or historic properties might be present.

The Proposed Project involves rehabilitation of an existing transportation and no new development of vacant land and will not affect farmland in any adverse way.

The No Action Alternative would not avoid geologic hazards and risks, and in fact the bridge would be more vulnerable to earthquake shaking if it is not structurally rehabilitated.

3.1.2 Streams, Water Quality, Drainage and Waters of the U.S.

A water quality and biological study of the project site was performed by AECOS Inc. The report is attached as Appendix 3 and a portion is summarized in the section below, from which most scholarly references have been removed for readability.

Existing Environment: Streams and Water Quality

The project site is located on Kapa'a Stream on Kawaihau Road, between Moalepe and Kahuna Roads. Because of relatively impermeable soils and a well-developed stream network, most rainfall that falls on this part of Kaua'i and does not evapotranspire reaches the sea as stream flow rather than through groundwater.

The waters of Kapa'a Stream originate on the slopes of the Makaleha Mountains in the Keālia Forest Reserve in east Kaua'i. Moalepe, Makaleha, and Kapahi tributaries originate south of the Keiwa Ridge and contribute to the Kapa'a flow upstream from the project site. Mimino, Keālia, and Maiakii Streams originate north of the Keiwa ridge and flow seaward before reaching confluence with Kapa'a Stream downstream from the Kapahi Bridge in lower Kapa'a Homesteads. The stream's terminus is a coastal estuary at the ocean on the southern end of Keālia Beach. The 16.5-square-mile Kapa'a watershed is highly modified with numerous reservoirs, ditches, and siphons diverting waters from their natural flow. The complex stream system has a total stream length of 59.2 miles.

Kapa'a Stream (State ID code 2-2-004) is classified by the State of Hawai'i as a perennial stream. The stream appears on the Hawai'i Department of Health list of impaired waters in Hawai'i (HDOH, 2008), prepared under Clean Water Act §303(d). The listing indicates that water quality within the stream may not meet all State water quality standards for streams. Kapa'a Stream is listed as impaired only for turbidity in both the wet and dry seasons.

In order to investigate baseline water quality of the stream in this area, AECOS conducted field measurements for temperature, dissolved oxygen, and pH and collected and water samples for analysis of conductivity, total suspended solids, turbidity, nitrate-nitrite nitrogen, total nitrogen, and total phosphorus from three stations near Kapahi Bridge on October 20, 2011. Nutrient concentrations were found to be low. During the water quality sampling, Kapa‘a Stream near Kapahi Bridge had good water quality. Turbidity levels and total suspended solids concentrations were quite low, and total nitrogen concentrations ranged from only 97 to 199 µgN/l, levels considered excellent for Hawaiian streams. However, values found in the survey cannot be directly compared with the water quality standards to assess compliance because comparison requires that representative geometric mean values be calculated from a minimum of three sampling events.

Existing Environment: Drainage and Waters of the U.S.

The Flood Insurance Rate Map (FIRM) for the project area indicate that the project site is designated Zone X, not determined to be within the 100- or 500-year flood plain (Figure 6). However, based on the information that floods do occur at the bridge, hydraulic consultants analyzed the potential for damage to the bridge if it were rehabilitated. Fieldwork in January 2012 provided information on the expected flow patterns in the stream to assist in the hydraulic and scour analysis. Local residents interviewed during bridge inspections reported that about ten times a year, the stream flow gets high enough to hit the pipes crossing the stream, and once every year or two, the stream flow gets high enough to begin flowing over the deck of the existing bridge. Floods have been severe enough to wash away the bridge railings, which have been subsequently replaced. The north overbank area floods on a regular basis, with flow primarily on the road and affecting the residence on the makai side (northeast) of the bridge. Concrete flood barriers have been placed around the front of the property to protect the structure. Furthermore, the bridge opening gets plugged with large woody debris during major flow events. A long-time resident said that during larger flow events, large logs get stuck vertically between the bridge and channel bed. The jammed log then collects further woody debris, constricting the bridge opening and causing bridge overtopping.

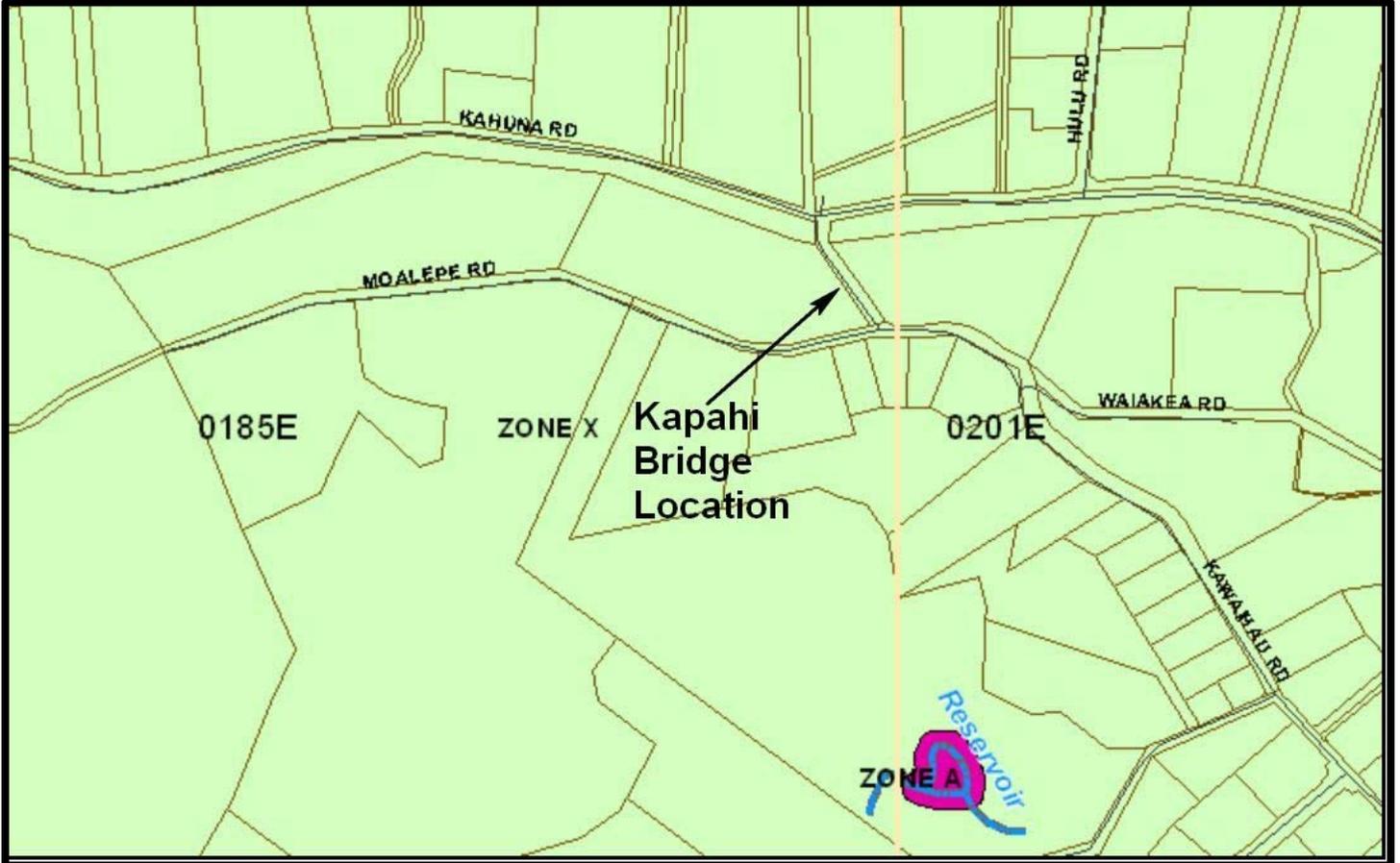
According to the latest EPA guidance (http://www.epa.gov/indian/pdf/wous_guidance_4-2011.pdf), based on the EPA’s interpretation of the Clean Water Act (CWA), implementing regulations and relevant case law, the following waters are considered waters of the U.S. protected by the CWA:

- Traditional navigable waters;
- Interstate waters;
- Wetlands adjacent to either traditional navigable waters or interstate waters
- Non-navigable tributaries to traditional navigable waters that are relatively permanent, meaning they contain water at least seasonally; and
- Wetlands that directly abut relatively permanent waters.

In addition, the following waters are protected by the Clean Water Act if a fact-specific analysis determines they have a “significant nexus” to a traditional navigable water or interstate water:

- Tributaries to traditional navigable waters or interstate waters;
- Wetlands adjacent to jurisdictional tributaries to traditional navigable waters or interstate waters; and
- Waters that fall under the “other waters” category of the regulations.

Figure 6: Flood Insurance Rate Map of Project Site



Source: FEMA Flood Insurance Rate Map (FIRM 150020185E)

The U.S. Army Corps of Engineers (USACE) is the agency with jurisdiction over waters subject to the Clean Water Act, and the agency consulted to determine if it agency had information on waters of the U.S. In its response (see Appendix 1a), the USACE noted that activities that involved Kapa‘a Stream below the Ordinary High Water Mark (OHWM) and adjacent wetlands, if any, would require further coordination with the USACE to determine appropriate permitting. In order to determine whether any project activity associated with the bridge rehabilitation project would occur within waters of the U.S., and thus be under jurisdiction of the USACE per the Clean Water Act, AECOS Inc. scientists surveyed Kapa‘a Stream in the area of bridge and established the OHWM. An approximately 400-foot long segment was surveyed to assess biological and physical characteristics, which serve as indicators of water flow. Clean Water Act jurisdiction in streams extends across the stream bed and up the banks to the OHWM, defined in federal regulations [33 CFR 328.3(e)] as:

“... the line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.”

Sediment sorting and destruction of terrestrial vegetation were clear indicators of the OHWM at this location. Project design has completely avoided areas at or near the OHWM by locating the new abutments behind the old ones, away from the stream channel, meaning there will be no excavation in the stream bank area.

Impacts and Mitigation Measures: Construction-Phase

One of the goals of project design has been to avoid the discharge of dredged or fill materials into waters of the U.S., which were determined to be present in Kapa‘a Stream below the OHWM, as discussed above.

However, if not properly mitigated, construction in any project can produce uncontrolled excess sediment from soil erosion during and after excavation and construction, which may impact natural watercourses, water quality and flooding. Contaminants associated with heavy equipment and other sources during construction may impact surface water and groundwater if not mitigated effectively. The potential for impacts at the project site is limited because of the small scale of a few hundred square feet of construction. Design has taken into account the potential discharge of sediment-laden storm water runoff into the stream. In order to minimize the potential for sedimentation and erosion, the contractor shall perform all earthwork and grading in conformance with the Kaaui County Code. Although the project is expected to disturb far less than an acre of surface, dewatering and hydrotesting may be required, and based on the construction method selected by the contractor, the project may need to obtain a National Pollutant Discharge Elimination System (NPDES) permit from the State Department of Health before the project commences.

The project will include a number of best management practices (BMPs) for the project in conformance with the requirements of the County Sediment and Erosion Control Permit and NPDES permit, as determined during final design. These may include, but may not be limited to, the following:

- *Drainage.* On-site drainage shall be handled in such a way as to control erosion, prevent damage to downstream properties and to return water to the natural drainage course in a manner that minimizes sedimentation or other pollution to the maximum extent practicable.
- *Dust control.* All areas disturbed by construction activities shall control dust emissions to the maximum extent practicable through the application of BMPs that may include watering with trucks or sprinklers, erection of dust fences, limiting the area of disturbance, and timely grassing of finished areas.
- *Vegetation.* Whenever feasible, natural vegetation, especially grass, will be retained. After being uprooted, displaced, or dislodged from the ground by excavation, clearing or grubbing, any trees, timber, plants, shrubbery and other woody vegetation that must be removed will not be stored in or deposited along the banks of the stream. This material will be removed within a reasonable time, no longer than three months from when it was uprooted, displaced, or dislodged.
- *Erosion controls.* Any disturbed areas shall be stabilized with erosion control measures that may include: staging construction; clearing only areas essential for construction; locating potential nonpoint pollutant sources away from steep slopes, water bodies, and critical areas; routing construction traffic to avoid existing or newly planted vegetation; protecting natural vegetation with fencing; tree armoring, and retaining walls or tree wells; stockpiling topsoil, covering the stockpile to prevent dust, and reapplying the topsoil; covering or stabilizing all soil stockpiles; using wind erosion control; intercepting runoff above disturbed slopes and conveying it to a permanent channel or storm drain; constructing

benches, terraces, or ditches at regular intervals to intercept runoff on long or steep disturbed or man-made slopes; providing linings or other method to prevent erosion of storm water conveyance channels; using check dams where needed to slow flow velocities; using seeding and fertilizing, mulching, sodding, matting, blankets, bonded fiber matrices, or other effective soil erosion control technique; and providing vehicle wheel wash facilities for vehicles before they leave the site.

- *Sediment control.* Measures shall be taken to capture sediment that is transported in runoff to prevent the sediment from leaving the site. Sediment control measures include sediment basins; sediment traps; filter fabric silt fences; straw bale, sand bag, or gravel bag barriers; inlet protection: stabilized construction entrances, and other measures to minimize off site tracking of sediment by construction vehicles; and vegetated filterstrips.
- *Material and waste management.* Measures to insure the proper storage of toxic material and prevent the discharge of pollutants associated with construction materials and waste shall implement.
- *Timing of control measure implementation.* Timing of control measure implementation shall be in accordance with the approved erosion control plan. At a minimum, disturbed areas of construction sites that will be redisturbed for twenty-one days or more shall be stabilized (grassed or graveled) by no later than the fourteenth day after the last disturbance.

The No Action Alternative would avoid potential impacts to water quality during construction, but the eventual deterioration of the bridge would require dismantling activities that would entail precautions to those necessary during rehabilitation in order to avoid impacts.

Impacts and Mitigation Measures: Operational

Operation and maintenance of Kapahi Bridge will not involve any impact on floodplains, dredge or fill in waters of the U.S., or erosion, sedimentation and water quality. In terms of operation and maintenance, there would be no differences between the proposed project and the No Action Alternative.

To minimize the potential for damage to the bridge during high water events, hydraulic engineers ran a computer hydraulic model using the 2-year, 100-year, and 500-year recurrence interval discharges. These floods have a 50 percent, 1 percent, and 0.2 percent chance of recurring each year, respectively. The two-year event was run to confirm the validity of the model (i.e., computing water surface elevations that reach the existing top of bridge elevation). Based on the hydraulic model results, the 100-year flow can be expected to overtop the bridge/roadway elevation by approximately 3 feet (and 4 feet for the 500-year flow). This represents a conservatively high estimate because some flow may leave the stream along the right (south) overbank. The computed scour is less than one foot for the proposed bridge, but the analysis indicated that a safety factor needed to be considered, and a scour depth of 3 feet below the minimum channel elevation was recommended and will be used in final design. Because the new abutments will be placed behind the existing abutments, which will remain, the need for additional erosion/scour protection is not anticipated.

3.1.3 Flora, Fauna and Ecosystems

A biological and water quality study of the project site was performed by AECOS Inc. The report is attached as Appendix 3 and a portion is summarized in the section below, from which most scholarly references have been removed for readability.

Existing Environment: Terrestrial Flora

Gagne and Cuddihy (1990) described the vegetation in fairly undisturbed areas of the main Hawaiian Islands with similar geology and climate as lowland mesic forest. It is difficult to speculate on the more specific pre-human vegetation of the area, since early Hawaiian and subsequent agricultural activities together with the spread of weedy plants and trees have totally transformed the area, including even the soil and microclimate.

A botanist with AECOS conducted a survey of the flora in the immediate vicinity of the existing Kapahi Bridge and 400 feet upstream and downstream for areas within 30-40 feet of the stream bank. A variety of common weedy species occupy the road verge above the left bank of the stream. Above the right bank downstream, tobacco (*Nicotiana tabacum*) is being farmed. Only along the right bank upstream of the bridge there is more or less continuous forest vegetation extending away from the stream. This zone is dominated by trees – mostly mango (*Mangifera indica*), breadfruit (*Artocarpus altilis*), kukui (*Aleurites moluccana*) and rose apple (*Syzygium jambos*), shrubs (especially Turk’s cap or *Malvaviscus pendiflorus*), and vines (wood rose or *Merremia tuberosa* and pothos or *Epipremnum pinnatum*) that provide shading to the stream. Near the bridge itself, where trees are absent, elephant grass (*Pennisetum purpureum*) occupies the left bank. In other areas, wedelia (*Sphagneticola trilobata*) and honohono or dayflower (*Commelina diffusa*) are abundant above the stream banks. Yellow-flowered ginger (*Hedychium flavescens*) and Job’s tears (*Coix lachryma-jobi*) are common along the stream down from the bridge.

In all, 77 species of ferns and flowering plants were identified from the riparian zone at the project site (see Table 3 of Appendix 3). Of these, 5 species (6.5%) are considered plants indigenous to the Hawaiian Islands. All five are generally common species in Hawai‘i but uncommon on the project site. Another 6 species (7.8%) are early Polynesian introductions (so-called “canoe plants”), some of which are plentiful here. The remaining 66 species are plants introduced (non-native) and now naturalized in the Islands. Naturalized species are not regarded as special or deserving of protection, although larger trees that shade the stream may provide a useful ecological function.

None of the plant species at the Kapahi Bridge site is listed as endangered or threatened species by State (HDLNR 1998) or federal (USFWS 2011) regulations, and none is important from a resource conservation perspective.

Existing Environment: Terrestrial Fauna

One avian point count station was situated on the northeast side of the bridge in a location that shielded the sound of the rushing water in Kapa‘a Stream. An 8-minute point count was made at this count station, and the area was walked to observe other birds. Additionally, a 30-minute time dependent waterbird count was conducted from the bridge. Forty-one individual birds of 11 different species and representing 10 separate families were recorded during the point count (see Table 5 of Appendix 3). All species detected are alien to the Hawaiian Islands. Avian diversity and densities were in keeping with the vegetation present on the site, and its location. The most commonly recorded species was Nutmeg Mannikin (*Lonchura punctulata*). No waterbirds or water obligate species were detected during the course of the 30-minute time dependent waterbird count, and additional 30-minute observations made subsequently have also failed to observe native waterbirds here, although they are probably occasionally present. Avian diversity and densities are in keeping with habitats present within the site.

Although not detected during this survey, the Hawaiian Petrel (*Pterodroma sandwichensis*) and the Hawaiian sub-species of Newell’s Shearwater (*Puffinus auricularis newelli*) have been recorded over-flying the general project vicinity between late April and the middle of December each year. Additionally, the Save Our Shearwaters Program has recovered both species from the general area on an annual basis over the past three decades. The ‘uluhe (*Dicranopteris linearis*) fern-covered slopes of Kaiwa Ridge is typical of the nesting habitat used by both species, though it is currently unknown if there are any colonies in close to the project site.

The Hawaiian Petrel is listed as endangered, and Newell’s shearwater as threatened, under both federal and State of Hawai‘i endangered species statutes. The primary cause of mortality in both species is thought to be predation by alien mammalian species at the nesting colonies. Collision with man-made structures is regarded as a second most significant cause of mortality of these seabird species in Hawai‘i. Nocturnally flying seabirds, especially fledglings on their way to sea in the summer and fall, can become disoriented by exterior lighting. Disoriented seabirds may collide with manmade structures and, if not killed outright, become easy targets of predatory mammals. No suitable nesting habitat for either of these seabird species exists at the project site.

The principal impact that typical construction projects on Kaua‘i pose to Newell’s Shearwaters and Hawaiian Petrels is potential downing after the birds become disoriented by exterior lighting that might be used for night construction activities, servicing of construction equipment at night, or streetlights erected for public safety reasons. To reduce the potential for adverse interactions between nocturnally flying seabirds and structures, all external lighting associated with the project needs to be properly shielded.

With the exception of the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*; ‘ōpe‘ape‘a), all terrestrial mammals currently found on the Island of Kaua‘i are alien species. Most are ubiquitous. The survey of mammals was limited to visual and auditory detection, coupled with visual observation of scat, tracks, and other animal sign. Biologists encountered tracks, scat, and sign of pig (*Sus s. scrofa*) within the forested riparian zone, and saw horses (*Equus c. caballus*) and cattle (*Bos taurus*) in pastures to the north of the stream. Additionally, several dogs (*Canis f. familiaris*) were heard barking from within private properties on both sides of the stream.

The endangered Hawaiian hoary bat was not detected during the course of this survey. It is, however, probable that this species uses resources within the general project area on a seasonal basis, as the species is all but ubiquitous in the lowlands of Kaua‘i. The impact that the project potentially poses to bats is during the clearing and grubbing phases of construction as vegetation is removed. The removal of vegetation within the project site may temporarily displace bats using the vegetation for roosting. As bats use multiple roosts within their home territories, this disturbance from the removal of vegetation is likely to be minimal. However, during the pupping season, female bats carrying pups may be less able to rapidly vacate a roost site when the vegetation is cleared. Additionally, adult female bats sometimes leave their pups in the roost tree while they forage and very small pups may be unable to flee a tree that is being felled. Potential adverse impacts from such disturbance can be avoided or minimized by not clearing woody vegetation taller than 15 feet between June 1 and September 15, the period when female bats are likely to be tending pups.

Existing Environment: Aquatic Biota

Prior published reports indicated that native species, including ‘o‘opu nākea (*Awaous guamensis*), ‘o‘opu nopili (*Sicyopterus stimpsoni*), ‘o‘opu ‘alamo‘o (*Lentipes concolor*) and ‘ōpae kala‘ole (*Atyoida bisulcata*), inhabit or migrate through stream waters at the project site. Upstream, Kapa‘a Stream is also home to at least one known population of Newcomb’s snail (*Erinna newcombi*), a lymnaeid snail listed as threatened under the provisions of Endangered Species Act. Critical habitat for the species has been designated (USFWS 2002) and includes two areas upstream in the Kapa‘a Watershed above 600 feet in elevation.

Aquatic resources within Kapa‘a Stream were identified by surveying aquatic biota using dip nets and visual observation. The aquatic biota comprises a mix of native and non-native species (see Table 4 of Appendix 3). Filamentous tufts of green algae (*Rhizoclonium* sp.) are present in areas of swift water flowing near the bridge. Schools of mosquitofish (*Gambusia affinis*), molly (*Poecilia* spp.), and swordtail (*Xiphophorus helleri*) account for nearly all of the fish observed in the stream near the site. Indigenous ‘o‘opu nākea (*Awaous guamensis*) is the only native fish encountered in the survey. A few Tahitian prawns (*Macrobrachium lar*) inhabit deep or sheltered pools just upstream from the bridge. Dojo (*Misgurnus anguillicaudatus*) are seen resting on the stream bottom in leaf litter. Upstream from the project site, in Kapa‘a and Makaleha Streams, the fish community assemblage is rather different. Though the same species of topminnow fishes are present, their abundance is much lower and native stream gobies comprise the bulk of fishes in the stream. Large ‘o‘opu nākea are abundant, and ‘o‘opu nopili (*Sicyopterus stimpsoni*) and ‘o‘opu ‘alamo‘o (*Lentipes concolor*) are common in pools from about the 450 to the 1,200-foot elevation. Despite the fact that native species like ‘o‘opu and the scarlet Kaua‘i damselfly (*Megalagrion vagabundum*) are the only biota encountered regularly above the confluence at 800-foot elevation, introduced bullfrog adults and tadpoles (*Lithobates catesbeianus*) have managed to recruit to a plunge pool beneath a waterfall at the 1,200-foot elevation in the south branch of Makaleha Stream.

Impacts and Mitigation Measures

The biological effects of the project would be limited to the construction area in and directly adjacent to the bridge. The area is dominated by non-native species, and no threatened or endangered plant species or rare plant communities are present.

As discussed above, several terrestrial vertebrates listed by the federal and State governments as threatened or endangered are present in this part of Kaua‘i and may overfly, roost, nest, or utilize resources in the project area, including the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), the endangered Hawaiian Petrel (*Pterodroma sandwichensis*), and the threatened Newell’s Shearwater (*Puffinus auricularis newelli*). No night work, temporary or permanent lighting or erect structures such as poles are planned, and there is no installation or movement of overhead existing utility lines, and therefore no potential impacts to listed seabirds are anticipated. Woody vegetation taller than 15 feet, which may serve as roosts for Hawaiian hoary bats, will not be cleared between June 1 and September 15, the period when female bats are likely to be tending pups.

The project includes Best Management Practices (BMP) that will be developed as part of grading permits and other approvals that will minimize any environmental impacts to water quality and aquatic biota in the vicinity of the project site during construction. Stream flow will be maintained at all times to allow passage of native species.

The following additional mitigation will be implemented:

- All on-site project personnel will be apprised that they are working in an environmentally sensitive area and that endangered Hawaiian waterbirds may be in the vicinity of the project.
- If any federally protected species appears in the project area, work activity will be temporarily suspended until the bird leaves the area of its own accord.
- The project will conserve the maximum amount of stream and riparian habitat for native stream species by avoiding placement of fill or structures in the stream for temporary diversion or construction purposes, and minimizing any stream hardening (including concrete channelization) associated with the bridge replacement or restoration of the stream bed.

The No Action Alternative would avoid any disturbance of existing conditions.

The U.S. Fish and Wildlife Service (USFWS) provided a technical assistance letter in response to an early consultation request on April 6, 2012 (see Appendix 1a). The letter provided information on survey recommendations, measures to preserve aquatic habitat function avoid and minimize impacts to federally listed, endangered Hawaiian waterbirds, seabirds, and other resources in the project area, and general best management practices for aquatic areas. Many of the Best Management Practices have been incorporated into the project, as discussed above under mitigation measures. The NEPA environmental documentation will include the results of consultation under Section 7 of the Endangered Species Act, including the determination of whether the project is likely to adversely affect listed species and additional mitigation measures, if required.

3.1.4 Air Quality, Noise, and Scenic Resources

Environmental Setting

Air pollution in the project area, which is far from sources of manmade pollution, is generally excellent with no violations of criteria pollutants. During dry periods, construction activities and farming can produce occasional dust. Occasionally in the winter visibility is affected by particulates that derive from sulfur dioxide (SO₂) emissions that drift up on southerly winds from Kilauea Volcano on the Island of Hawai'i. The SO₂ component of these emissions is converted into vog (i.e., volcanic smog) when it interacts chemically with sunlight, atmospheric oxygen, moisture, and dust. At the concentrations and frequencies found in Kaua'i, vog is generally not considered a health hazard.

Noise on the project site is generally quite low, and is derived principally from motor vehicles, farms and nearby residences.

Views on the site are scenic, typical of rural streamside areas of Kaua'i (see Figure 1-4). Kapahi Bridge offers a pleasing manmade element that complements the dense vegetation and flowing stream waters.

Impacts and Mitigation Measures: Air Quality

There is some potential for fugitive dust emissions during grading and construction. Short-term direct and indirect impacts on air quality could occur during construction, principally through fugitive dust from vehicle movement and soil excavation, and exhaust emissions from onsite construction equipment. The State of Hawai'i Air Pollution Control Regulations (Chapter 11-60, HAR) prohibit visible emissions of fugitive dust from construction activities beyond the property line. Thus, an effective dust control plan for the project construction phase is essential.

As discussed in Section 3.1.2, above, the County of Kaua'i Sediment and Erosion Control Permit will include provisions to control dust. All areas disturbed by construction activities shall control dust emissions to the maximum extent practicable through the application of BMPs that may include watering with trucks or sprinklers, erection of dust fences, limiting the area of disturbance, and timely grassing of finished areas.

Onsite mobile and stationary construction equipment also would emit air pollutants from engine exhaust. The largest of this equipment is usually diesel powered. Nitrogen oxide emissions from diesel engines can be relatively high compared to gasoline-powered equipment, but the standard for nitrogen dioxide is set on an annual basis and is not likely to be violated by short-term construction equipment emissions. Carbon monoxide emissions from diesel engines, on the other hand, are low and should be relatively insignificant compared to vehicular emissions on nearby roadways.

In addition, to avoid air quality impacts from slow-moving construction vehicles traveling to and from the site on major roadways, heavy construction equipment will be moved on-site during periods of low traffic volume.

The No Action Alternative would avoid the mostly mitigable potential air quality impacts described above.

Impacts and Mitigation Measures: Noise

Noise impacts would occur during removal of portions of the bridge, grading of approaches, and construction of new bridge elements. These activities would generate noise exceeding 95 decibels at times, impacting nearby areas. In cases where construction noise is expected to exceed the Department of Health's (DOH) "maximum permissible" property-line noise levels, contractors are required to obtain a permit per Title 11, Chapter 46, HAR (Community Noise Control) prior to construction, in conformance with the statements provided by the Department of Health, Indoor and Radiological Health Branch's letter of April 28, 2012, in response to early consultation. DOH would review the proposed activity, location, equipment, project purpose, and timetable in order to decide upon conditions and mitigation measures, such as restriction of equipment type, maintenance requirements, restricted hours, and portable noise barriers.

The No Action Alternative would involve no construction noise. If the bridge deteriorates to the point where it needs to be removed, operational noise impacts would shift to other crossing locations.

Impacts and Mitigation Measures: Scenic Resources

The proposed Kapahi Bridge rehabilitation project essentially duplicates existing conditions with very minor changes that have been carefully coordinated with agencies and organizations to minimize impacts to historic character, particularly visual impacts. Permanent adverse visual impacts, such as interference with scenic views or insertion of incongruous or clashing visual elements, would not occur. Minor and temporary scenic impacts that would not require mitigation would occur during construction.

The No Action Alternative would preserve existing views exactly as they are, at least until the bridge deteriorated to a point where it would need to be closed. Subsequent dismantling activities would involve temporary visual impacts similar to those that would occur during rehabilitation, albeit for a shorter period.

3.1.5 Hazardous Substances, Toxic Materials and Hazardous Conditions

Existing Environment, Impacts and Mitigation Measures

No known hazardous substances are present on the project site. Although it is unlikely that any potentially hazardous, toxic or radioactive waste would be found on the proposed project site, reasonable precautions would be undertaken in the context of the project's BMP plan to include provisions for the appropriate response and remediation should any such hazardous, toxic, or radioactive material be encountered during the construction phase of the project.

3.2 Socioeconomic and Cultural

3.2.1 Socioeconomic Characteristics

Existing Environment

The project would affect and benefit all users of the bridge in the project area, including residents, businesses, schools, emergency service providers and visitors. Table 1 provides information from the United States 2010 Census of Population and the American Community Survey on the socioeconomic characteristics of the Wailua-Anahola area (the smallest census unit that includes detailed data for the project area) along with those of the State of Hawai‘i as a whole for comparison.

In general, the Wailua-Anahola area is fairly typical of Hawai‘i communities, but with slightly greater proportions of whites and fewer Asians, a slightly higher median age and fewer young people (but also fewer elderly), greater incomes, a lower poverty rate, smaller households and higher home vacancy rates than the State of Hawai‘i as a whole.

Impacts and Mitigation Measures

Overall, the project would substantially benefit socioeconomic conditions by providing a safe bridge that will continue to allow efficient access from homes, farms and ranches to jobs, medical care, schools, and other destinations. Pedestrians and bicyclists using the bridge will benefit from markings that promote driver awareness and safer conditions. There is no need for extensive right-of-way acquisition that would have an effect on any resident or business.

The project would provide some short-term construction jobs which would almost certainly be filled by on-island residents, and would not induce in-migration. The reader is referred to Section 3.7.9 for a discussion of environmental justice.

3.2.2 Public Services

Existing Environment, Impacts and Mitigation Measures

The current five-ton load restriction on the bridge limits the access of larger vehicles associated with schools and emergency services. Kapa‘a Elementary, Middle and High Schools are all located near each other on the north end of Kapa‘a on Kawaihau and Mailihuna Roads. The Kapa‘a Fire Station is located on Kuhio Highway just north of Kuamo‘o Road in Wailua. School buses, fire trucks and ambulances are all required to take more circuitous routes to access certain homes, a restriction which would be lifted by the proposed project, saving time and fuel and improving emergency response.

Table 1
Selected Socioeconomic Characteristics

U.S. CENSUS OF POPULATION, 2010		
CHARACTERISTIC	State of Hawai'i	Wailua-Anahola CCD
POPULATION		
Total population	1,360,301	12,607
Under 21 years old	26.2%	24.9%
65 years and older	14.3%	13.5%
Median Age	38.6 years	42.5 years
RACE		
White	24.7%	39.6%
Asian	18.6%	38.6%
Native Hawaiian and Other Pacific Islander	10.0%	13.0%
Two or More Races	23.6%	27.3%
HOUSEHOLDS AND HOUSING		
Households with children under 18 years	27.7%	26.0%
Householder living alone	22.4%	23.3%
Average household size	2.89 persons	2.74 persons
Owner-occupied housing units	57.7%	61.4%
Percent vacant housing units	12.4%	17.8%
AMERICAN COMMUNITY SURVEY 2005-2009, ESTIMATES		
CHARACTERISTIC		
Median household income (in 2009 inflation-adjusted dollars)	\$63,030	\$70,408
Individuals below poverty level	10.7%	7.9%
Households with Food Stamp/SNAP benefits in the past 12 months	3.9%	9.1%
Born in U.S.	78.9%	92.7%
Born in different state	23.9%	35.6%
Speak language other than English in home	25.9%	9.3%
Persons 25 or older, high school graduate or higher	89.9%	93.4%
Population 16 years or older in labor force	66.6%	69.7
OCCUPATION		
Management, business, science, and arts	33.0%	32.8%
Service	22.4%	19.9%
Sales and office	26.3%	25.7%
Natural resources, construction, and maintenance	10.2%	13.4%
Production, transportation and material moving	8.1%	8.3%

Source: U.S. Census Bureau, 2010 Census. 2010 Census Redistricting Data (Public Law 94-171) Summary File, Tables P1, P2 P3, P4, H1; and American Community Survey (U.S. Census Bureau American Factfinder Webpage. (X) data not available or applicable.

Note: for small populations such as Wailua-Anahola, error estimates are often large.

3.2.3 Cultural Resources

Scientific Consultant Services, Inc. (SCS), prepared a Cultural Impact Assessment (CIA) for approximately one acre on and around the Kapahi Bridge complex in Kapa‘a Homesteads Series 1, Kapa‘a Ahupua‘a, Kawaihau District, Kaua‘i Island. The CIA involved consultation of historical and ethnographic material as well as consultation with an extensive set of individuals. Readers are referred to Appendix 4 for a discussion of background, methodology and historical and cultural details. The section below summarizes the findings of the CIA, from which most scholarly references have been removed for readability.

Cultural and Historical Background

Kapa‘a is one of ten *ahupua‘a* located in the area known as Puna Moku during traditional times (Handy and Handy 1972:423). The project site is within the Kapahi area of Kapa‘a Homesteads, which were opened in 1913. The project site, which includes Moalepe Stream, and adjacent lands bordering the stream and bridge access points, has undergone numerous modifications in the past, including the bridge construction and road construction.

Approximately 600 years ago, the Hawaiian population had expanded throughout the Hawaiian Islands to a point where large, political districts could be formed. At that time, Kaua‘i consisted of six districts, or moku: East and West Kona, Puna, Ko‘olau, Halele‘a, and Nāpili. Land was considered to be the property of the king or *ali‘i ‘ai moku* (the leader who controls the island/ district), which he held in trust for the gods. The title of *ali‘i ‘ai moku* ensured rights and responsibilities to the land, but did not confer absolute ownership. The king kept the parcels he wanted; his higher chiefs received large parcels from him, and in turn, distributed smaller parcels to lesser chiefs. The *maka ‘āinana* (commoners) worked the individual plots of land.

In general, several terms, such as moku, *ahupua‘a*, *‘ili* or *‘ili ‘āina* were used to delineate various land sections. A district (*moku*) contained smaller land divisions (*ahupua‘a*) that customarily continued inland from the ocean and upland into the mountains. Extended household groups living within the *ahupua‘a* were therefore able to harvest from both the land and the sea. Ideally, this situation allowed each *ahupua‘a* to be self-sufficient by supplying the needed resources from different environmental zones. The *‘ili* or *‘ili ‘āina* were smaller land divisions next in importance to the *ahupua‘a* and were administered by the chief who controlled the *ahupua‘a* in which it was located. The *mo‘o ‘āina* were narrow strips of land within an *‘ili*. The land holding of a tenant or *hoa ‘āina* residing in an *ahupua‘a* was called a *kuleana*.

The Hawaiian economy was based on agricultural production and harvesting marine resources, as well as raising livestock and collecting wild plants and birds. Extended household groups settled in various *ahupua‘a*. During pre-Contact times, there were primarily two types of agriculture, wetland and dryland, both of which were dependent upon geography and physiography. River valleys, such as those on Kaua‘i, provided ideal conditions for wetland *kalo* (*Colocasia esculenta*)—agriculture that incorporated pond fields and irrigation canals (*auwai*). Other cultigens, such as *kō* (sugarcane, *Saccharum officinarum*), *mai‘a* (banana, *Musa sp.*), and *‘uala* (sweet potato, *Ipomoea batatas*) were also grown.

Coastal zones were utilized for marine resources, habitation, burials, and ceremonial structures often associated with fishing. Often, land sections located in back of the shoreline contained pond fields and dunes that were

used for sweet potato production. Trails linked the *makai* and *mauka* sections of the *ahupua'a*, allowing easy access to its resources. Other trails skirted the coast, which made communication between *ahupua'a* possible.

It is said that many years ago, the fire goddess Pele and her family briefly stopped on Kaua'i to explore the possibility of finding a permanent home. She dug a deep pit, but it was instantly filled with water, so they left Kaua'i and traveled on, and eventually settled in Halema'uma'u, on the island of Hawai'i, where she resides to this day (Beckwith 1976).

Handy and Handy (1972: 424) state that Kapa'a "is famous as the home of the great *ali'i* Mo'ikeha who lived there in his later years." It was also the home of the boy Pāka'a, who lived there with his mother and uncle. Pāka'a longed to go with the fishermen who caught his favorite food (*mālolo*, flying fish), but they always refused his pleas. So, Pāka'a invented the crab-clawed sail and challenged the fishermen to a race, betting that whoever reached the shore first could keep the day's catch. Pāka'a won the race and that night he and his family had all the *mālolo* they could eat (Wichman 1998:85).

The inland portion of Puna District (Kawaihau) contains a number of small streams along which small *lo'i* were developed. The *ahupua'a* of Kapa'a has been described as a broad, wide, and deep *kula* land containing small ridges and valleys inland and two small streams. Handy and Handy (1972:423) note that "...there was a highly developed irrigation system at Kapa'a..." with "...extensive flatlands located below the mountains with terraces irrigated from Kapahi, Makaleha, and Moalepe Streams." In the homestead area, many little valleys contain taro terraces.

The first recorded Western contact in the Hawaiian Islands was made in 1778 on the southern coast of Kaua'i, but there is no description of the eastern coast until Captain George Vancouver traveled up the coast from Wailua in 1793. As there was no anchorage, he sailed towards Kapa'a, noting that this was: "...the most fertile and pleasant district of the island..." (Joesting 1987:50).

In the 1840s, traditional land tenure shifted drastically with the introduction of private land ownership based on Western law. The Māhele of 1848 divided Hawaiian lands between the king, the chiefs, the government, and began the process of private ownership of lands. The subsequently awarded parcels were called Land Commission Awards (LCAs). Once lands were made available and private ownership was instituted, the *maka'āinana* (commoners) were able to claim the plots on which they had been cultivating and living, if they had been made aware of the procedures. These claims did not include any previously cultivated but presently fallow land, stream fisheries, or many other resources necessary for traditional life. If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA and issued a Royal Patent after which they could take possession of the property.

Kapahi Bridge is not within any former LCAs or land grants. However, there are adjacent lands demarcated as land grants and land court applications. A majority of these inland claims were associated with streams, where wetland *kalo* was produced and house sites were scattered about the agricultural area.

Commercial sugarcane agriculture came to Keālia during the middle to late 19th century. The Kealia Sugar Plantation was in operation from 1869 until 1885, and the Makee Sugar Company ran from 1877 until 1933. Sugar brought with it not only agricultural transformation but also a steamer landing, railroads, ditch water

systems, and new towns to support the thousands of foreign laborers from China, Portugal, Japan and elsewhere.

The Keālia Plantation began as a partnership between Captain Makee and King Kalākaua and his partners in the Hui Kawaihau. Makee was given land in Kapa‘a for a mill and he agreed to grind cane supplied by the Hui members. Kalākaua also established a new district in Kaua‘i (Kawaihau) that included all of the land between Wailua and Moloa‘a, where the Hui could cultivate their crops.

The Kapa‘a Homesteads were established in 1913. Initially, many in the government did not see homesteading here as a highly viable venture. Most of the proposed homestead lands were at the time controlled by large businesses and the government, who characterized homesteads as a land grab that would remove lands from the profitable sugarcane industry. This argument did not prevail and the lands became available to homesteaders, many of whom grew sugarcane and pineapple for the larger companies. However, just a few decades later, most homesteaders were occupied in fields outside agriculture, and the homesteads became more residential in nature.

Traditional Cultural Resources and Practices on the Project Site

Documentary and field research indicated that the Kapahi Bridge project site does not appear in itself to have significance in the traditional Hawaiian cultural history of the area, and does not seem to be the site for cultural practices, such as gathering. The archaeological and historic sites work discussed in the next section identified just one historic property, Kapahi Bridge itself.

In addition to documentary and field research, an effort was made to consult with knowledgeable parties about potential traditional cultural properties and associated practices that might be present or have taken place in this area of Kaua‘i. Consultation for the CIA was conducted via telephone, e-mail, and the U.S. Postal Service with a number of local residents, historic and cultural experts, and others. A CIA Notice was published on multiple dates in the *Honolulu Star-Advertiser*, the *Garden Island*, and the OHA newspaper, *Ka Wai Ola*. These notices requested information of cultural resources or activities in the area of the proposed project, stated the TMK number, and where to respond with pertinent information.

The responses, which are detailed in Appendix 4, assisted in developing the assessment of the potential effects on cultural resources in the project area. Responses in general focused on the historic value of the bridge in the context of the Kapa‘a Homesteads area, and there were no suggestions or information from the contacted individuals and organizations regarding cultural sites or practices that might be present and affected by the bridge rehabilitation. Several community informational meetings that were well attended by local residents did not reveal any cultural concerns or issues, but they did reinforce the community’s attachment to the historic character of the bridge. In summary, the project site itself does not appear to support any traditional resource uses, nor are there any specific Hawaiian customary and traditional rights or practices known to be associated with affected area.

Impacts and Mitigation Measures

It is reasonable to conclude based on the lack of identified cultural resources or practices that the exercise of native Hawaiian rights, or any ethnic group, related to gathering, access or other customary activities will not be affected by development activities.

Although there are no indications so far from literature review or consultation with State Historic Preservation Division, the Office of Hawaiian Affairs, or local residents knowledgeable about Hawaiian cultural practices that there are any specific traditional cultural properties or practices on or near the project site, various parties were supplied a copy of the Draft EA in order to help finalize this finding.

3.2.4 Archaeology and Historic Sites

Scientific Consultant Services, Inc. (SCS), prepared an Archaeological Inventory Survey (AIS) for approximately one acre on and around the Kapahi Bridge complex in Kapa‘a Homesteads Series 1, Kapa‘a Ahupua‘a, Kawaihau District, Kaua‘i Island. The AIS included field inspection of the site, a review of previous archaeological and historic work in the area, and evaluation of the significance of the one historic property found to be present, Kapahi Bridge itself. Readers are referred to Appendix 2 for a discussion of background, methodology and historical and cultural details, and are also referred to Section 3.2.3 above, which includes historical information not presented here to avoid redundancy. In the interest of readability, the summary below has eliminated most scholarly references; readers interested in sources may consult Appendix 2. Selected correspondence related to historic preservation, including determination and concurrence letters from the State Historic Preservation Division/Officer, are included at the end of Appendix 2.

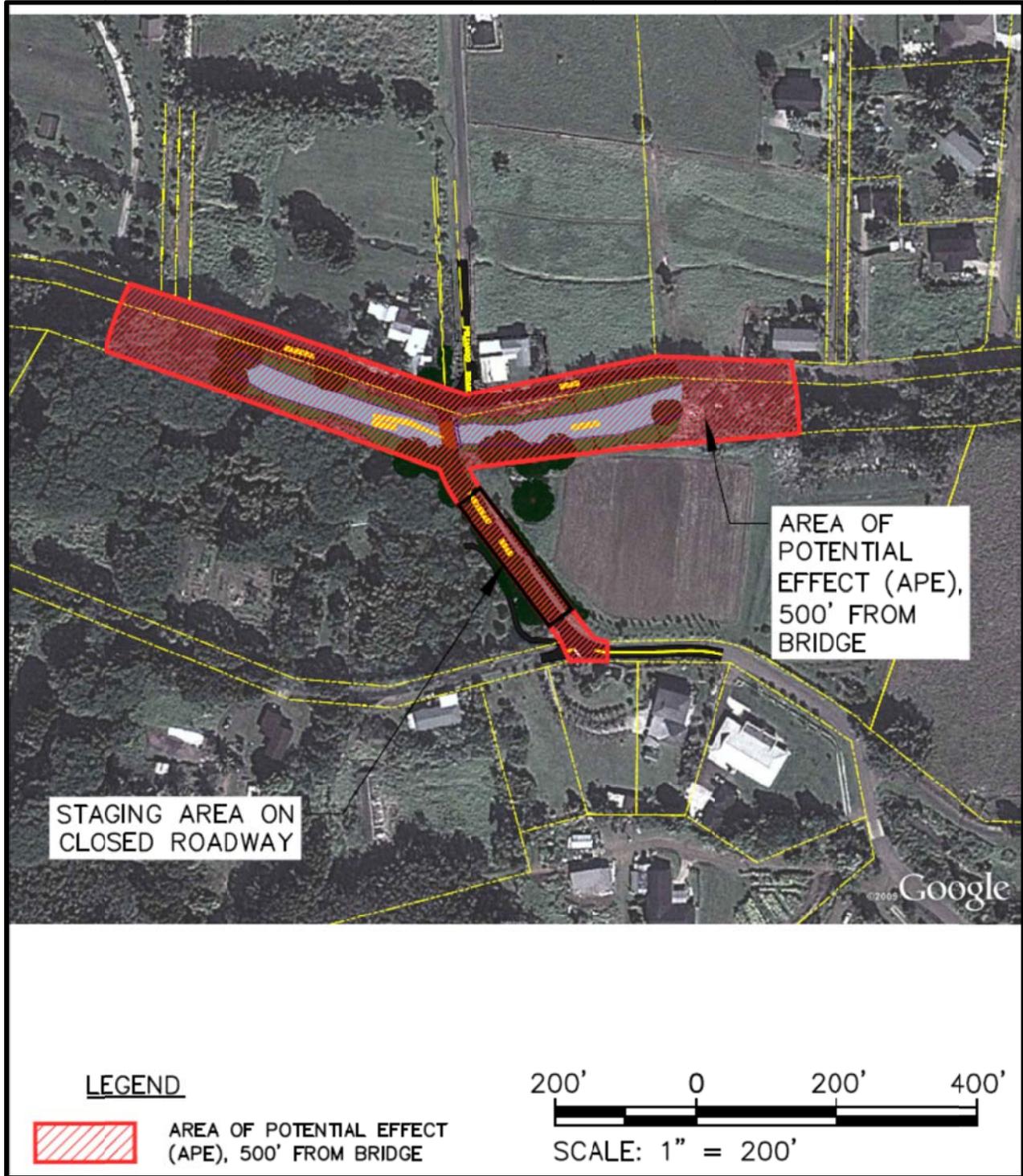
Existing Environment

As part of National Historic Preservation Act (NHPA) Section 106 compliance (36 CFR 800.4(a)(1)) for this project¹, a conservative Area of Potential Effects (APE) was established by DPW that made up about 2.9 acres, including all land at and around the bridge that could be impacted in any way (Figure 7).

The AIS conducted on approximately one acre on and around the Kapahi Bridge identified only one site, the historic Kapahi Bridge (State Site 50-30-08-2157). Kapahi Bridge exhibits a single 36-foot span, with a total length of 38 feet, and the height of the underside of the bridge above the stream bed measures approximately nine feet. Kapahi Bridge has undergone several design modifications over the years. The original three-span, timber stringer bridge, built sometime after 1907, was replaced (probably in 1937) by the current bridge. In 1977, some of the original building materials were replaced, with only the original abutments being retained. The original timber decking and piers, which were not removed, were replaced by steel girders. However, the southern pier, which had been subjected to flood damage, was removed. As the original wooden planks had become weathered and worn they were replaced with steel planks.

¹ As discussed in Chapter 1, although this document is meant to comply with Chapter 343, HRS, only, the need to comply with NEPA has been recognized and effects to historic properties have been conducted in conformance with Section 106 of the NHPA. By letter of April 25, 2012 to the SHPO, the Federal Highway Administration, Hawai‘i Division delegated authorization to the Hawai‘i Department of Transportation and the County of Kaua‘i, Department of Public Works, to conduct this consultation. This section is also meant to discuss compliance with Chapter 6e, HRS.

Figure 7: Area of Potential Effect to Historic Properties



Certain elements of Kapahi Bridge indicate a potential for significant historic characteristics. Kapahi Bridge, together with surrounding roads, provided an integral transportation link that assisted in the success of the homestead lands. The bridge represents a strong relationship with early to mid-Twentieth Century land use in the Kapa‘a Homesteads area. According to an evaluation by Spencer Mason Architects (1989), the Kapahi Bridge had integrity at least in terms of original location (over Kapa‘a Stream). The bridge also has at least some artistic value, as exhibited in the geometrical white lines of the railing and the positioning of the sloping braces.

However, the structural integrity of the Kapahi Bridge has been altered several times. While some of the original bridge components were retained, most of the components supporting the bridge have been replaced with steel. The steel stringer/multi-beam structural type is not unique, as there are other bridges on island which exhibiting the same structural type. As the date of construction has not been firmly established the Kapahi Bridge cannot be considered as a good example of a bridge associated with a specific time period. The bridge measures 38 feet in length with the height of the underside of the bridge nine feet above the stream bed. These relatively small dimensions indicate that the engineering of the Kapahi Bridge is not complex. Previous County bridge inventories stated that Kapahi Bridge had low integrity and little historic significance. It had never been included in prior Statewide bridge inventories.

The project archaeologists evaluated the site according to criteria established for the Hawai‘i State Register of Historic Places (HAR§13-275-6). The site was initially determined to be significant under State of Hawai‘i historic preservation Criterion D, for information content. As all necessary information had been collected as part of the AIS and previous bridge inventories, the archaeologists recommended no further archaeological work for the bridge and the surrounding one-acre area.

In response to the early consultation letter, which did not specify a design for the rehabilitation, the State Historic Preservation Division (SHPD) indicated in a letter of April 4, 2012 (see end of Appendix 2), that the bridge did have significance under Criterion A (Events, development of roadways in the area to assist homesteading) and Criterion C, (architecture). The County, believing that despite this statement from SHPD, the bridge did not appear to be eligible for the State or National Register of Historic Places, proposed a design that would widen the bridge by 7.5 feet and separating a bike lane with striping was submitted to the SHPD) along with the AIS on March 1, 2013. In a letter of March 30, 2013 (see end of Appendix 2), the SHPD stated that in its view the bridge was eligible for the State and National Registers and that the proposed design would have an effect on this historic property.

Impacts and Mitigation Measures

In the interest of resolving this issue, the County of Kaua‘i engaged in further intensive consultation with SHPD and other agencies and organizations that had expressed interest during early consultation. Through an iterative design process arrived at a design that minimized alteration of the appearance of the bridge but addressed critical safety concerns. The Kaua‘i Historic Preservation Advisory Council (KHPRC), which assists SHPD in designating historic properties and assessing effects, reviewed the design during its November 2013 meeting. In a letter of November 25, 2013 (see end of Appendix 2), KHPRC concurred that the rehabilitation would have no adverse effect, under the conditions that the design continue to maintain the existing bridge width and use timber deck planks placed transversely on top of concrete deck. Both of these conditions are part of design. As

the agency responsible for Section 106 consultation, the FHWA submitted a letter to State Historic Preservation Officer (SHPO) William L. Aila on January 15, 2014 (see end of Appendix 2), outlining the project history and consultation process. The letter also asked for SHPO concurrence with FHWA's "no adverse effect" determination for the subject project, which was made in consultation with KHPRC, SHPD, the Historic Hawai'i Foundation, and other interested parties and individuals. This process resulted in the revised design for Kapahi Bridge presented in this EA that does not involve widening and includes preservation of most visual elements. The FHWA has determined "no adverse effect" with the following conditions:

- Qualified personnel meeting the Secretary of Interior's Standards for historic architect will be included in the review process
- Above qualified personnel will also be involved in the review of designated submittals by contractor, such as shop drawings or requests for substitutions, and at key milestones in the construction process.
- SHPD will review at phases such as 65% design, 100% design and specs to ensure the above design direction is followed.
- Mitigation measures during the construction of the proposed improvements have been and will continue to be implemented to avoid and minimize potential impacts to archaeological, cultural, and historic resources. The following mitigation measures have been or will be implemented, at a minimum:
 1. If cultural materials are discovered during construction, all earth-moving activity within and around the immediate discovery area will be diverted until a qualified archaeologist can assess the nature and significance of the find.
 2. If human remains are discovered, Hawaii Administrative Rules Title 13. Subtitle 13, Chapter 300 states that further disturbances and activities shall cease in any area or nearby area suspected to overlie remains, and SHPD and Police Department will be contacted. The appropriate process would then proceed in conformance with Hawaii Administrative Rules §13-300 Subchapter 4 "Procedures for Property Treatment of Burial Sites and Human Skeletal Remains."
 3. The County of Kauai will prevent the disturbance or taking of any historic property or resource to the extent possible by instituting these mitigation measures and enforcing their implementation by contractors.

FHWA, HDOT, and the County of Kaua'i are awaiting a response letter from the SHPO and expects concurrence with this determination. The Final EA will report on the status of the SHPO review.

3.3 Infrastructure

3.3.1 Utilities

Existing Facilities, Impacts and Mitigation Measures

Kapahi Bridge carries Kawaihau Road over the Kapa‘a Stream close to the intersection with Kahuna Road. Overhead utility lines run along Kahuna Road and extend near the location of the proposed north abutment. The project may include temporarily relocation of these overhead lines so that a crane can safely remove and replace the bridge structure.

Two waterlines cross over the Kapa‘a Stream adjacent to the Kapahi Bridge on the downstream side. The waterlines are 10-inch and 12-inch ductile iron and are supported independently of the bridge by steel I-beams that span over the width of the stream. The waterlines have thrust blocks near the location where the proposed north abutment will be placed. The project may include relocating one or both of the waterlines several feet downstream and away from the bridge to provide additional clearance between thrust blocks and bridge abutment.

Electrical, telephone and water utility companies and agencies will be coordinated with throughout the design and construction process, and no adverse impacts to utilities or their customers are expected to occur.

3.3.2 Traffic

The bridge crosses Kapa‘a Stream on Kawaihau Road, between Moalepe and Kahuna Roads. Typical daytime traffic volumes are very light, less than 500 vehicles per hour, with few forced stops because of the one-lane restriction. Because of the geometry of the approaches, relatively few motorists speed on the approach to the bridge (i.e., exceeding the 15 MPH limit by at least 10 MPH). Pedestrian and bicycle use occurs but accounts for only a small fraction of total use. A Traffic Study conducted in mid-2013 counted 5 to 6 pedestrians per hour. This does not approach the level of approximately 100 pedestrians per hour that begins to affect the Level of Service for motor vehicles on a one-lane bridge and merit consideration of two lanes for traffic flow.

Impacts and Mitigation Measures

The project would necessitate a detour during construction, which would be expected to last as much as 12 months. The construction detour route will involve rerouting traffic along Kahuna Road and/or Kawaihau Road and could involve as much as 3.5 miles, depending on traveler origin/destination (see Figure 1).

Long-term, the rehabilitation will benefit traffic flow by allowing passage by school buses, fire trucks, and other large vehicles that currently experience ongoing detours and associated inconvenience and expense. The “sharrow” markings that promote driver awareness will benefit all traffic and create safer conditions for pedestrians and bicyclists using the bridge.

3.4 Secondary and Cumulative Impacts

Secondary impacts from road projects can include substantial population changes or effects on public facilities. Although the project would provide some short-term construction jobs, these would almost certainly be filled by local residents and would not induce in-migration. The project would only serve to alleviate long detours for vehicles over three tons, and no adverse secondary impacts are expected.

Cumulative impacts result when implementation of several projects that individually have limited impacts combine to produce more severe impacts or conflicts in mitigation measures. At the current time, there are no other known construction projects in the area with impacts that have potential to combine with those from the bridge rehabilitation project. The adverse construction effects of the project – very minor and temporary disturbance to air quality, noise, visual and traffic congestion quality during construction – are very limited in severity, nature and geographic scale. Retaining the historic character of the bridge to the greatest feasible degree through retaining its original width and using materials in harmony with the original design have minimized impacts to the historic character of the bridge that could accumulate with other changes in the area to become significant. None of the impacts from the project would accumulate with adverse impacts from any other projects.

3.5 Required Permits and Approvals

Table 2 provides a list of major required permits and approvals.

Table 2. Permits and Approvals

Permit/Approval	Applicable Activities	Regulatory Agency
Compliance with NEPA (National Environmental Policy Act)	Separate review to be completed post-Chapter 343, HRS EA	Federal Highway Administration (FHWA)
National Pollutant Discharge Elimination System (NPDES) Permit (potential)	Hydrotesting and dewatering, depending on methods selected by contractor.	State Department of Health, Clean Water Branch
Community Noise Permit	Construction with potential to cause noise	State Department of Health, Indoor and Radiological Health (IRH) Branch
Historic Sites Review (Section 106 of NHPA and Chapter 6e, HRS)	Any construction in the vicinity of a designated historic place or archaeological site	State Department of Land and Natural Resources (DLNR), Historic Preservation Division
Work in County Right-of-Way	Any work.	County of Kaua‘i Department of Public Works (DPW)
Subdivision Approval	Dividing or consolidating parcels of land for right-of-way, if additional ROW required	County Planning Department
Grading, Grubbing, Excavating and Stockpiling Permits	Any excavation or fill, removal of vegetation from the surface, or the purposeful accumulation and set-aside of loose soil	County DPW

After the Chapter 343/NEPA Environmental Assessment and historic sites review processes are complete, the project will apply for the construction permits (and subdivision permits if necessary). When these permits are granted, construction may begin.

3.6 Consistency with Government Plans and Policies

3.6.1 Hawai‘i State Plan

Adopted in 1978 and last revised in 1991 (Hawai‘i Revised Statutes, Chapter 226, as amended), the Plan establishes a set of themes, goals, objectives and policies that are meant to guide the State’s long-run growth and development activities. The three themes that express the basic purpose of the Hawai‘i State Plan are individual and family self-sufficiency, social and economic mobility and community or social well-being. The project would promote these goals primarily by enhancing public safety through rehabilitating a bridge that has degraded to the point where there are serious safety concerns and restrictions on many types of vehicles, including school buses and fire trucks, while preserving historic character.

3.6.2 Hawai‘i State Land Use Law

All land in the State of Hawai‘i is classified into one of four land use categories – Urban, Rural, Agricultural, or Conservation – by the State Land Use Commission, pursuant to Chapter 205, HRS. The project site is located in the State Land Use Agricultural District. The project is consistent with permitted uses within this District.

3.6.3 Kaua‘i General Plan and Zoning

The *Kaua‘i General Plan* was adopted in November 2000 and provides broad policy statements to guide land use regulations, new developments and facilities, and planning for County facilities and services (County of Kaua‘i 2000). The General Plan employs projections of employment and population to 2020 in forecasting land supply and infrastructure needs and, subsequently, in developing land use plans and long-range plans for public facilities and services.

In Chapter 5 of the General Plan, “Preserving Kaua‘i’s Rural Character”, an essential part of the Vision and one of the driving ideas of the General Plan is to preserve Kaua‘i’s special rural character, which includes “how the built areas relate to the natural features of the landscape, how people get around.” Among characteristics cited are the relatively small scale of Kaua‘i’s roads and the presence of natural vegetation along the roads.

The Kawaihau Land Use map, as well as Section 7.1.3 of Plan identifying future projects needed by 2020, includes future roadways but does not include bridges that require rehabilitation. It is presumed that existing bridges that serve rural communities are important transportation elements that need to be maintained and improved. In Chapter 6 of the General Plan, Section 6.2 addresses policies for the Kawaihau District. Among community assets identified in the area are “rural scenery, open space, and agricultural lands.”

The General Plan notes that:

“The vast basin between the Wailua River and the Kapa‘a Homesteads continues its transition from agricultural to residential use. Home-building continues to increase, as small holdings are divided up. Conversion of land from Agricultural zoning to Residential zoning, the subdivision of agricultural lots, and the building of Additional Dwelling Units (ADUs) have all contributed to increasing the population of this area. Local roads and water systems were not designed to support residential uses and, in many cases, are overburdened. Fire protection is a problem because of poor road access and lack of fire-flow capacity in the water systems. Traffic, water, fire protection and drainage problems will compound as the number of residences continues to grow” (p. 6-10).

In Section 6.2.3 on Issues and Opportunities, the General Plan states:

“In conclusion, the County should take measures to assure that adequate roads and other facilities are available to serve the homestead areas as they build out to their zoned densities. In addition, the County should refrain from zoning changes that would increase density, considering the potential cumulative impacts (p. 6-11).

In that the project rehabilitates a facility that is important for local transportation, improves safety for pedestrians and bicycles, does not increase lane capacity and preserves rural character, and preserves the historic character of the bridge to the greatest practical degree, the project is highly consistent with the General Plan.

The area is zoned for agriculture and classified as “Agriculture” in the Kawaihau Land Use Map of the GP. Public facilities such as roads and bridges are permitted and appropriate uses in these designations.

3.7 Federal Laws and Executive Orders

Section 3.7 discusses federal laws and executive orders that will be addressed in more depth in the NEPA environmental documentation. Some have already been referenced in the context of resource evaluation in other sections of this chapter.

3.7.1 Coastal Zone Management Act (CZMA) and Coastal Barriers

No Coastal Barriers are present in the State of Hawai‘i. The Hawai‘i Coastal Zone Management (CZM) Program was established in 1977 through the adoption of the Coastal Zone Management Act, incorporated in Chapter 205A HRS. Projects with federal involvement significantly affecting areas under jurisdiction of the State CZM Agency must undergo review for consistency with the State’s approved coastal program. The entire State of Hawai‘i is included in the coastal zone for such purposes. The CZM objectives are outlined as follows.

- Recreational Resources. Provide coastal recreational opportunities accessible to the public.
- Historic Resources. Protect, preserve, and, where desirable, restore those natural, man-made historic, and pre-historic resources in the CZM area that are significant in Hawaiian and American history and culture.
- Scenic and Open Space Resources. Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources.

- Coastal Ecosystems. Protect valuable coastal ecosystems from disruption and minimize adverse impacts on all coastal ecosystems.
- Economic Use. Provide public or private facilities and improvements important to the State's economy in suitable locations.
- Coastal Hazards. Reduce hazard to life and property from tsunamis, storm waves, stream flooding, erosion, and subsidence.
- Managing Development. Improve the development review process, communication, and public participation in the management of coastal resources and hazards.
- Public Participation. Stimulate public awareness, education, and participation in coastal management, and maintain a public advisory body to identify coastal management problems and provide policy advice and assistance to the CZM program.
- Beach Protection. Protect beaches for public use and recreation; locate new structures inland from the shoreline setback to conserve open space and minimize loss of improvements due to erosion.
- Marine Resources: Implement the state's ocean resources management plan.

The County of Kaua'i, Department of Public Works has evaluated the project and believe that the project does not impact these coastal zone resources and is consistent with the objectives of the program. In accordance with consultation with the State Coastal Zone Management Program, the FHWA will conduct a review of the consistency and include the NEPA environmental documentation as part of the materials submitted to the Hawai'i Coastal Zone Management Program for CZMA consistency review.

Chapter 205A also established the *Special Management Area (SMA)*, which is an area of particular concern that requires a higher level of management to ensure the coastal resources are appropriately protected and managed. Accordingly, any development proposed within the SMA requires the approval of a minor or major use permit from the County of Kaua'i, depending on the cost and impact of the proposed activity. The project site is outside the SMA.

3.7.2 Clean Water Act, as Amended (33 USC 1251 et seq.)

It has been determined through fieldwork and confirmed through consultation with the U.S. Army Corps of Engineers (see letter of in Appendix 1a) that implementation of the project would not involve the discharge of dredged or fill materials into waters of the United States, as discussed in Section 3.1.2, above. This is predicated on the fact that the project will not involve work at, near or below the Ordinary High Water Mark of Kapa'a Stream, nor in any wetlands. The project would thus be in compliance with the Clean Water Act, Section 404(b)(1) Guidelines. None of the proposed construction materials would be expected to contain any contaminants.

As discussed in Section 3.1.2, although the project is expected to disturb far less than an acre of surface, dewatering and hydrotesting may be required, and based on the construction method selected by the contractor, the project may need to obtain a National Pollutant Discharge Elimination System (NPDES) permit from the State Department of Health, pursuant to Section 402 of the Clean Water Act. The Best Management Practices (BMPs) for the permit will be integrated with those associated with the Storm Water Pollution Prevention Plan (SWPPP) that will be prepared to comply with the grading ordinances of the County of Kaua'i. The BMPS will be part of construction documents and implemented during construction.

3.7.3 Clean Air Act As Amended (42 USC 7401, et seq.)

The Clean Air Act requires states to develop plans, called State Implementation Plans (SIP), for eliminating or reducing the severity and number of violations of National Ambient Air Quality Standards (NAAQS) while achieving expeditious attainment of the NAAQS.

The State of Hawai‘i and the federal government periodically monitor air quality to determine whether it meets the AAQ standards. Areas that do not meet these standards are termed non-attainment areas and are subject to Conformity Rules. These rules were issued by the Environmental Protection Agency (EPA) in response to Section 176 of the 1977 Clean Air Act. Conformity Rules prohibit any federal agency from engaging in any actions that do not conform to a state’s plan to correct nonattainment situations. The entire State of Hawai‘i is considered to have acceptable air quality and is thus an attainment area not subject to application of Conformity Rules.

The project would have no long-term affect on air quality. All equipment used in construction will be required to meet appropriate emission standards.

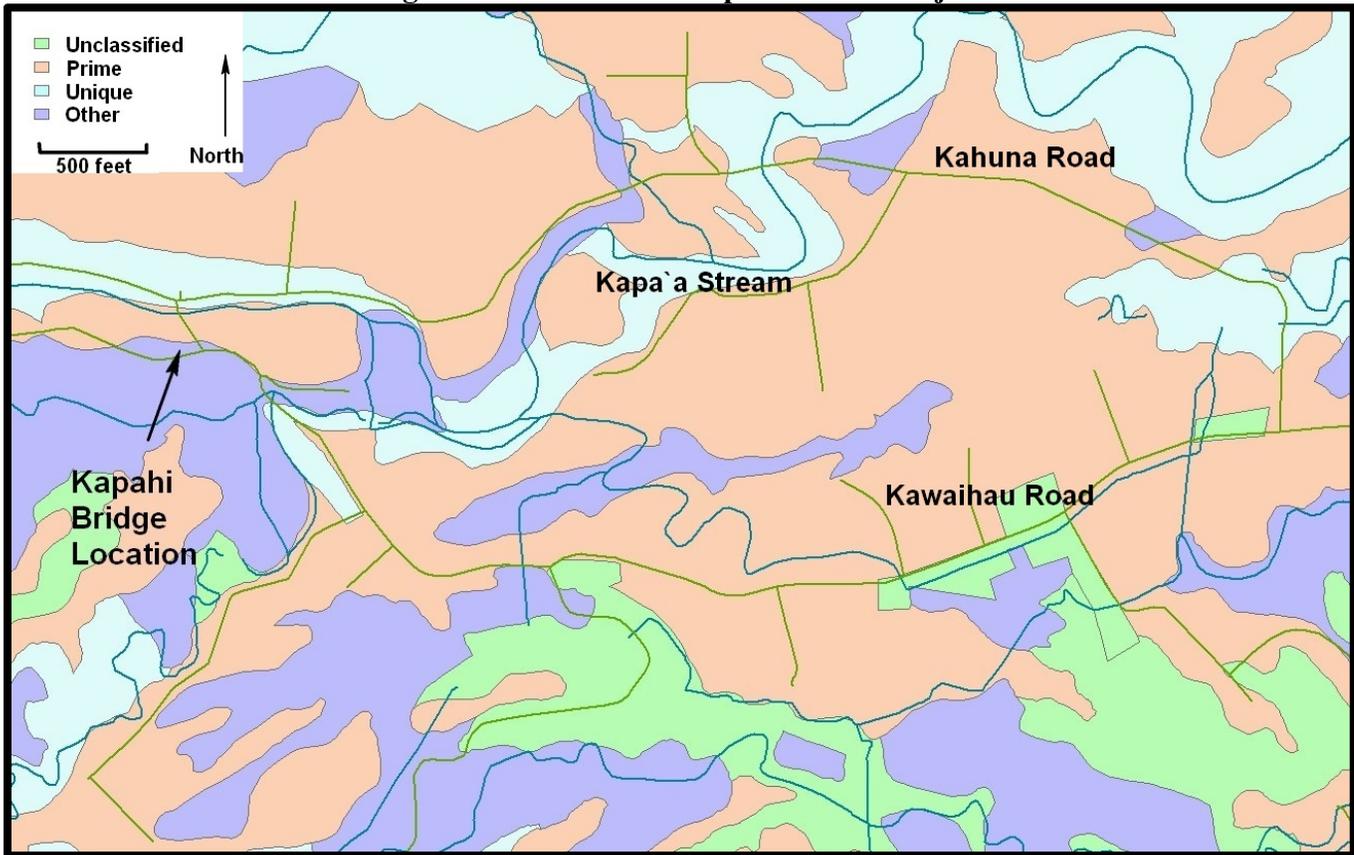
3.7.4 Wild And Scenic Rivers Act (16 U.S.C. 1271-1287)

The Wild and Scenic Rivers Act (P.L. 90-542, as amended) selected rivers of the Nation that possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values. The purpose of the Act is to preserve these rivers in their freeflowing condition, and protect them for the benefit and enjoyment of present and future generations. An inventory, the National Wild and Scenic Rivers System, was established in December 1, 1992 and is published by the Department of the Interior and the Department of Agriculture, Forest Service and can be found at the web site <http://www.nps.gov/rivers/wildriverslist.html#w>. No rivers in Hawai‘i are on this list, and thus there will thus be no impact to Wild and Scenic Rivers.

3.7.5 Farmland Protection Policy Act (7 U.S.C. 4201, et seq.)

The Farmland Protection Policy Act (Public Law 97-98, Sec. 1539-1549) requires identification of proposed actions that would affect any lands classified as prime and unique farmlands. Agencies must consider alternative actions that could reduce adverse effects and ensure that their programs, to the extent practicable, are compatible with State, local government and private programs and policies to protect farmland. The Agricultural Lands of Importance in the State of Hawai‘i (ALISH), prepared by the State Department of Agriculture, classifies lands into three categories: 1) Prime Agricultural Land, (2) Unique Agricultural Land, and (3) Other Important Agricultural Land. As shown in Figure 8, areas surrounding the project site are classified as Prime Agricultural Land. However, the actual bridge and associated construction sites are on or directly adjacent to road rights-of-way that are not capable of being farmed. No farmland would be lost. On the contrary, farming and ranching activities are currently inconvenienced by the 5-ton load restrictions. Loss of the bridge altogether due to deterioration would impose serious inconveniences on all drivers, including farmers and ranchers. In that sense, the proposed project supports farming.

Figure 8
Agricultural Lands of Importance in Project Area



Source: Hawai'i State GIS system

3.7.6 Resource Conservation and Recovery Act (RCRA) (42 USC 6901 et seq.)

RCRA was enacted in 1976 to address the issue of how to safely manage and dispose of municipal and industrial waste, regulate underground storage tanks (USTs) that store petroleum or hazardous substances, establish a system for managing solid (primarily nonhazardous) waste, including household waste, and set forth the framework for EPA's comprehensive waste management program.

No systematic records evaluation (i.e. Phase I Environmental Site Assessment and subsequent investigations) or intensive field investigation have been undertaken at the project site. The project site has been used as a bridge crossing for many decades, with no known history of industrial use, and there is no obvious evidence of dumping. Although it is unlikely that any potentially hazardous, toxic or radioactive waste would be found on the proposed project site, reasonable precautions would be undertaken in the context of the project's BMP plan to include provisions for the appropriate response and remediation should any such hazardous, toxic, or radioactive material be encountered during the construction phase of the project, in accordance with RCRA or CERCLA requirements. The project is in compliance with RCRA.

3.7.7 Executive Order 11988, Floodplain Management (24 May 1977)

Executive Order 11988 requires federal agencies to avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy of the floodplain, and to avoid direct and indirect support of floodplain development where there is a practicable alternative. In accomplishing this objective, “each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains.”

The project site is located outside the 500-year floodplain, and the floodplain will not be encroached on by the bridge rehabilitation project. The project is not inconsistent with EO 11988.

3.7.8 Executive Order 11990, Protection of Wetlands (24 May 1977)

Executive Order 11990 (and 23 CFR 771.126(a)(1)) state that it is federal policy to avoid long and short-term adverse impacts associated with the destruction or modification of wetlands, and to avoid direct and indirect support of new construction in wetlands where there is a practicable alternative. The Order further directs federal agencies to avoid undertakings in wetlands unless the head of the agency finds that there is no practicable alternative to such construction, and that the proposed action includes all practicable mitigation measures to minimize harm to wetlands which may result from such use. In the case of the project site, wetlands associated with streams may be present in various areas along Kapa‘a Stream, but the project does not involve any work near, at or below the Ordinary High Water Mark of the stream, and there is no activity within, or which would affect, wetlands.

3.7.9 Executive Order 12898, Environmental Justice

Executive Order 12898 directs every federal agency to identify and address disproportionately high and adverse human health or environmental effects of agency programs and activities on minority and low-income populations.

The project site is located in the Kapahi area of Kapa‘a Homesteads in Kaua‘i. As discussed in Section 3.2.1, the project area is a microcosm of Kaua‘i. Although in general the area has slightly greater proportions of whites and fewer Asians, greater incomes, a lesser poverty rate, smaller households and higher home vacancy rates than the State of Hawai‘i or as a whole or certain other areas of Kaua‘i, both minority and low-income populations are present, as shown in Table 1. On balance, low-income and minority populations would substantially benefit from the project, because the lack of a safe bridge is a hindrance in traveling to medical care, schools, jobs and family. As the project does not have adverse social effects such as extensive right-of-way acquisition or permanent noise impacts, it would not produce disproportionately high and adverse human health or environmental effects for low-income or minority populations.

3.7.10 National Historic Preservation Act (16 USC 470 et seq., 110)

The proposed project involves State land and State and federal funds, and thus the environmental documentation is being prepared pursuant to the National Environmental Policy Act (NEPA), the implementing regulations of the Council on Environmental Quality (40 CFR 1500-1508), and the U.S. Department of Transportation regulations for NEPA (23 CFR 771). To comply with these environmental regulations with respect to assessing potential impacts to historic properties, the archaeological survey was prepared in accordance with Section 106 of the National Historic Preservation Act (NHPA) (16 USC 470 et seq., 110) and its implementing regulations (36 CFR 800).

Section 106 requires that federal agencies identify and assess the effects of federally assisted undertakings on historic properties and to consult with others to find acceptable ways to resolve adverse effects. Properties protected under Section 106 are sites, buildings, structures, or objects included on or eligible for listing on the National Register of Historic Places. Eligible properties must generally be at least 50 years old, possess integrity of physical characteristics, and meet at least one of four criteria for significance. Regulations implementing Section 106 (36 CFR Part 800) encourage maximum coordination with the environmental review process required by the National Environmental Policy Act (NEPA) and with other statutes. Hawai‘i Revised Statutes 6E, Historic Preservation, also applies to the project.

As discussed above in Section 3.2.4, after a series of design and public meetings with a number of parties identified during the Section 106 consultation process, the FHWA submitted a letter to State Historic Preservation Officer (SHPO) William L. Aila on January 15, 2014 (see end of Appendix 2), outlining the project history and consultation process. This process resulted in the revised design for Kapahi Bridge presented in this EA that does not involve widening and includes preservation of most visual elements. The FHWA has determined “no adverse effect” with a number of conditions. FHWA, HDOT, and the County of Kaua‘i are awaiting a response letter from the SHPO and expects concurrence with this determination. The Final EA will report on the status of the SHPO review.

3.7.11 Section 4(f)

The material in this section references 42 U.S.C. 4332(2)(c), 49 U.S.C. 303, 23 U.S.C 138, and 23 CFR 774 (referred to as Section 4(f)). These requirements apply to all actions or projects undertaken by agencies of the U.S. Department of Transportation. The purpose of Section 4(f) is to ensure that special efforts are made to protect public parks and recreation lands, wildlife and waterfowl refuges, and historic sites. The law states that the Secretary of Transportation shall approve a project which requires the use of publicly owned land from a public park, recreation area, wildlife or waterfowl refuge, or historic site of significance only if (1) there is no prudent and feasible alternative to such use and (2) the project includes all possible planning to minimize harm to the resource being used. At this point in time, it does not appear that any use of these resources will occur, as it has been confirmed through fieldwork and consultation of agencies that there are no public parks and recreation lands or wildlife and waterfowl refuges at or near the Kapahi Bridge. As discussed above, FHWA, HDOT, and the County of Kaua‘i are awaiting a response letter from the SHPO and expects concurrence with this determination that the project will not have an adverse effect on the bridge and will not represent a “use” of this historic property in the context of Section 4(f). The Final EA will report on the status of the SHPO review. The FHWA will address this in detail in the NEPA environmental documentation for the project.

3.7.12 Endangered Species Act and Related Laws

The Endangered Species Act of 1973, as Amended (16 USC 1531-1544) the Migratory Bird Treaty Act and Migratory Bird Conservation Act (16 USC 701-715), and the Fish and Wildlife Coordination Act, as Amended (16 USC 661 et seq.). In accordance with Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended, federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed or proposed threatened or endangered species. The U.S. Fish and Wildlife Service (USFWS) was notified of the project location and action by letter in March 2012. As discussed in Section 3.1.3, the U.S. Fish and Wildlife Service (USFWS) provided a technical assistance letter in response to an early consultation request on April 6, 2012 (see Appendix 1a). The letter provided information on survey recommendations, measures to preserve aquatic habitat function avoid and minimize impacts to federally listed, endangered Hawaiian waterbirds, seabirds, and other resources in the project area, and general best management practices for aquatic areas. Many of the Best Management Practices have been incorporated into the project, as discussed above under mitigation measures. The NEPA environmental documentation will include the results of consultation under Section 7 of the Endangered Species Act, which is expected to be initiated during the review process for the State of Hawai‘i Draft EA. The NEPA documentation will include the determination of whether the project is likely to adversely affect listed species and additional mitigation measures, if required.

PART 4: DETERMINATION

Based on information to this point, the County of Kaua‘i, Department of Public Works, expects to determine that the project will not significantly alter the environment, as impacts will be minimal, and that an Environmental Impact Statement is not warranted, and is thus expected to issue a Finding of No Significant Impact (FONSI). Comments on the EA will be reviewed in order to ascertain whether this anticipated determination is appropriate.

PART 5: FINDINGS AND REASONS

Chapter 11-200-12, Hawai‘i Administrative Rules, outlines those factors State of Hawai‘i agencies must consider when determining whether an Action has significant effects:

1. *The project will not involve an irrevocable commitment or loss or destruction of any natural or cultural resources.* No valuable natural resources would be committed or lost. No threatened or endangered species, aquatic ecosystems or wetlands would be adversely affected. The project rehabilitates an existing bridge and avoids impacts to natural resources. The rehabilitation of the bridge will maintain its existing appearance to the greatest degree practical and has been determined to not have an adverse effect on this historic property.
2. *The project will not curtail the range of beneficial uses of the environment.* No restriction of beneficial uses would occur. The bridge rehabilitation project represents a beneficial use of the environment for essential transportation purposes.
3. *The project will not conflict with the State's long-term environmental policies. The State's long-term environmental policies are set forth in Chapter 344, HRS.* The broad goals of this policy are to conserve natural resources and enhance the quality of life. The project is minor, environmentally beneficial, and fulfills aspects

of these policies calling for an improved social environment. It is thus consistent with all elements of the State's long-term environmental policies.

4. *The project will not substantially affect the economic or social welfare of the community or State.* The project would not have any adverse effect on the economic or social welfare of the County or State. It would improve the social welfare of the community by curing a critical deficiency in the bridge infrastructure, allowing use by school buses and fire trucks and more safely accommodating pedestrians.

5. *The project does not substantially affect public health in any detrimental way.* The project would affect public health and safety in only beneficial ways by continuing to allow residents to access homes, jobs, school and emergency services in a safe and convenient manner.

6. *The project will not involve substantial secondary impacts, such as population changes or effects on public facilities.* The project would involve no population changes or effects on public facilities.

7. *The project will not involve a substantial degradation of environmental quality.* The potential for air water quality impacts during construction would be mitigated, and there will be no substantial degradation of any aspect of environmental quality.

8. *The project will not substantially affect any rare, threatened or endangered species of flora or fauna or habitat.* The project site supports overwhelmingly alien vegetation, and there will be no impacts to rare, threatened or endangered species of flora. Impacts to wide ranging threatened or endangered vertebrates will be avoided through construction timing and practices.

9. *The project is not one which is individually limited but cumulatively may have considerable effect upon the environment or involves a commitment for larger actions.* The adverse effects of the project – very minor and temporary disturbance to air quality, noise, visual and traffic congestion quality during construction – are very limited in severity, nature and geographic scale. None of the impacts from the project would accumulate with adverse impacts from the limited number of other projects in the area.

10. *The project will not detrimentally affect air or water quality or ambient noise levels.* No adverse effects on these resources would occur. Mitigation of construction-phase impacts will preserve water quality. Ambient noise impacts due to construction will be temporary and restricted to daytime hours.

11. *The project does not affect nor would it likely to be damaged as a result of being located in environmentally sensitive area such as a flood plain, tsunami zone, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal area.* Although the bridge may be overtopped during high stream flow events, the existing crossing site is the only practical and appropriate site, and the rehabilitation project is not imprudent to undertake.

12. *The project will not substantially affect scenic vistas and viewplanes identified in county or state plans or studies.* No scenic vistas and viewplanes identified in County or State plans or studies will be adversely affected by the project.

13. *The project will not require substantial energy consumption.* The rehabilitation and maintenance of the bridge would require consumption of energy, but no adverse effects would be expected.

REFERENCES

- Beckwith, M. 1976 *Hawaiian Mythology*. Honolulu: University of Hawai'i Press.
- Foote, D.E., E. Hill, S. Nakamura, and F. Stephens. 1972. *Soil Survey of the Islands of Oahu, Maui, Molokai, and Lanai, State of Hawaii*. U.S. Department of Agriculture Soil Conservation Service, Washington. D.C.
- Gagne, W., and L. Cuddihy. 1990. "Vegetation," pp. 45-114 in W.L. Wagner, D.R. Herbst, and S.H. Sohmer, eds. *Manual of the Flowering Plants of Hawai'i*. 2 vols. Honolulu: University of Hawai'i Press.
- Giambelluca TW, Chen Q, Frazier AG, Price JP, Chen Y-L, Chu P-S, Eischeid J., and Delparte, D. 2011. The Rainfall Atlas of Hawai'i. <http://rainfall.geography.hawaii.edu>.
- Handy, E.S.C., and E.G. Handy. 1972. *Native Planters in Old Hawaii*. B.P. Bishop Museum Bulletin No. 233. Honolulu.
- Hawai'i State Department of Land and Natural Resources. (HDLNR). 1998. *Indigenous Wildlife, Endangered and Threatened Wildlife and Plants, and Introduced Wild Birds*. Department of Land and Natural Resources. State of Hawaii. Administrative Rule §13-134-1 through §13-134-10, dated March 02, 1998.
- Kaua'i, County of. 2000. *Kaua'i General Plan*. Lihue, HI.
- Joesting, E. 1987. *Kauai, The Separate Kingdom*. Honolulu: University of Hawai'i Press and Kauai Museum Association, Limited.
- Macdonald, G.A., and A.T. Abbott. 1970. *Volcanoes in the Sea*. Honolulu: University of Hawai'i Press.
- Sherrod, D.R., Sinton, J.M., Watkins, S.E., and Brunt, K.M. 2007. *Geologic map of the State of Hawai'i*. U.S. Geological Survey Open-File Report 2007-1089. <http://pubs.usgs.gov/of/2007/1089/>.
- Spencer Mason Architects. 1989. *Historic Bridge Inventory: Island of Kauai*. Prepared for the State of Hawaii Department of Transportation, Highways Division, in coop. with the U.S. Department of Transportation, Federal Highway Administration, Honolulu.
- University of Hawai'i at Hilo, Dept. of Geography. 1998. *Atlas of Hawai'i*. 3rd ed. Honolulu: University of Hawai'i Press.
- U.S. Fish and Wildlife Service (USFWS). 2013. USFWS Threatened and Endangered Species System (TESS). Washington: GPO. http://ecos.fws.gov/tess_public/StartTESS.do
- Wichman, F.B. 1998. *Kaua'i Ancient Place Names and Their Stories*. Honolulu: University of Hawai'i Press.

[This page intentionally left blank]

KAPAHI BRIDGE REHABILITATION ENVIRONMENTAL ASSESSMENT

TMKs (4th): 4-6-04

Kawaihau District, County of Kaua‘i, State of Hawai‘i

Submitted Pursuant to Chapter 343, Hawai‘i Revised Statutes (HRS)
County of Kaua‘i, Department of Public Works

APPENDIX 1a

Comments in Response to Early Consultation and Related Correspondence

[This page intentionally left blank]

geometrician

ASSOCIATES, LLC
integrating geographic science and planning

phone: (808) 969-7090 fax: (866) 316-6988 PO Box 396 Hilo Hawaii 96721
rterry@hawaii.rr.com

March 30, 2012

Dear Agency/Organization Official:

**Subject: Early Consultation for Environmental Assessment for
Rehabilitation of Kapahi Bridge, Island of Kaua'i**

I am in the process of preparing a Draft Environmental Assessment (DEA) for a proposed federal aid County of Kaua'i activity that involves rehabilitation of Kapahi Bridge. The bridge crosses Kapahi Stream on Kawaihau Road, between Moalepe and Kahuna Roads (see attached maps and photos).

Among other deficiencies, the bridge has damaged timber posts and railings, corroded girders, undermined abutments, and an unsupported guardrail. A tree that fell during the severe storm of March 2012 further damaged the bridge. The bridge cannot support loads over 5 tons, which means that school buses, fire trucks, and many other large vehicles cannot cross it, causing ongoing detours of up to 3 miles and associated inconvenience and expense. If major repairs are not conducted, the County will be forced for safety reasons to close the bridge, leading to serious inconveniences for residents and businesses.

The bridge was built in 1937 and its historical value is being researched and will be reported as part of the EA. The proposed rehabilitation is being designed to preserve the character of the bridge, as practical. If appropriate, the EA will evaluate avoidance alternatives per Section (4) requirements of the U.S. Department of Transportation. The project would also relocate overhead utility lines and will either leave in place or relocate water lines.

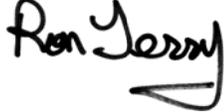
The EA process will be in compliance with the Hawai'i Environmental Policy Act, Chapter 343, HRS, and administrative rules at Title 11, Chapter 200, HAR. The project will be partially funded by the Federal Highway Administration (FHWA) and therefore the EA also needs to comply with the National Environmental Policy Act (NEPA) and implementing regulations thereof at 40 CFR Parts 1500 through 1508 and 23 CFR 771, as well as other relevant federal environmental laws and policies.

The areas of investigation in the Environmental Assessment will include but not be limited to the following: water quality assurance; wastewater treatment; flora, fauna, and

ecosystems; traffic impacts; geology, soils, and hazards; flooding and drainage impacts; social, community impacts; cultural impacts; historic sites; and economic impacts.

I would appreciate your comments on any special environmental conditions or impacts related to the development. Please contact me at 808-969-7090 (Big Island) if you have any questions or require clarification. Kindly indicate whether you wish to receive a copy of the EA or notice when the EA is completed and available on the OEQC website and in hardcopy at the public library.

Sincerely,

A handwritten signature in black ink that reads "Ron Terry". The signature is written in a cursive, slightly slanted style.

Ron Terry, Principal
Geometrician Associates





Kapahi Bridge





Kapahi Bridge

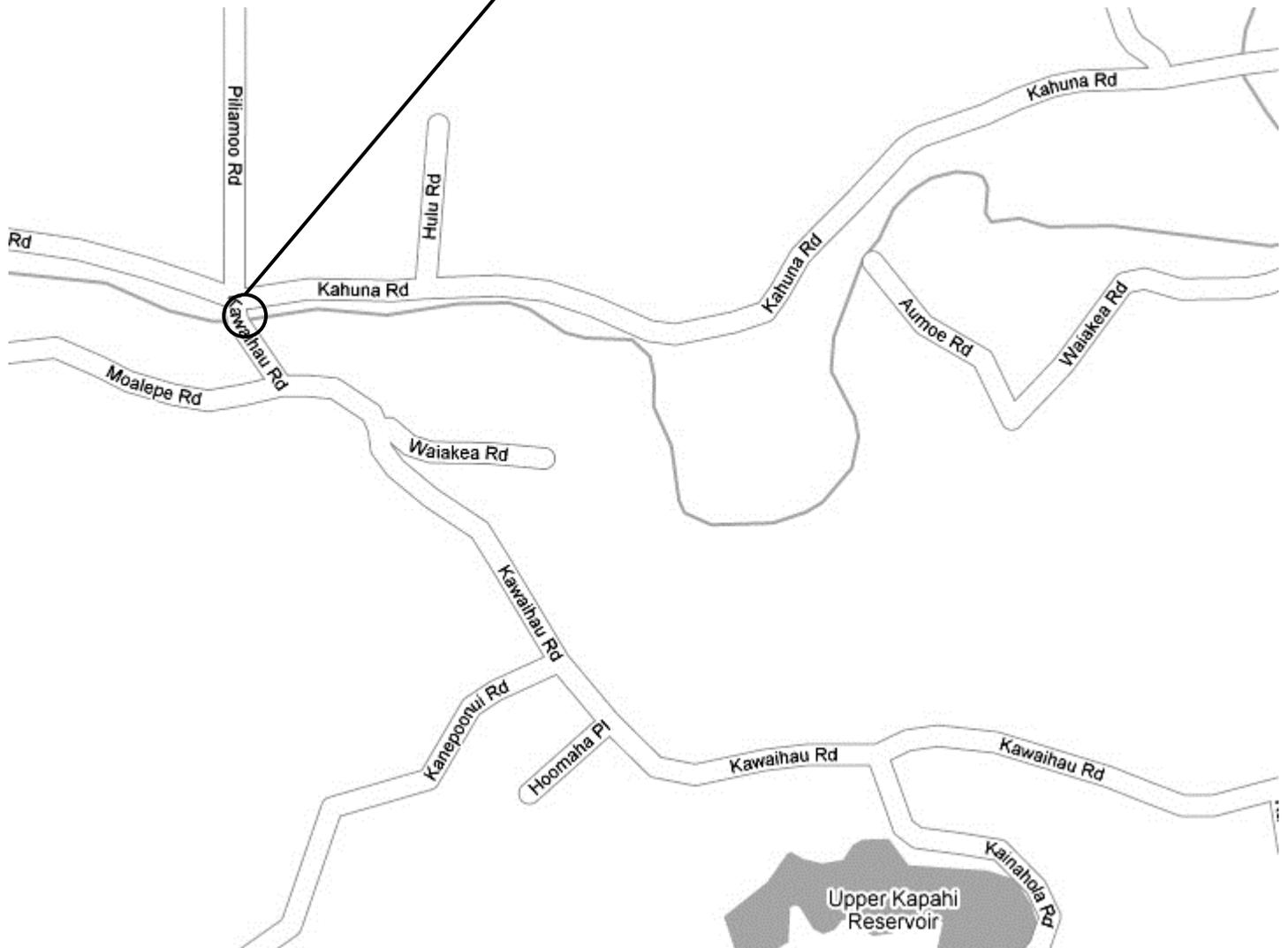
County of Kauai
Department of Public Works

Bridge No. 007460021146001

VICINITY MAP

Date 3/30/12

**BRIDGE LOCATION
T.M.K.: 4-6-04**



**HISTORIC
HAWAII
FOUNDATION**

VIA EMAIL TO:

TO: Kuuleialoha Santos, Chairperson
Kaua'i Historic Preservation Review Commission

MEETING DATE: Thursday, March 1, 2012
3:00 p.m.
Līhu'e Civic Center, Moikeha Building, Meeting Room 2A/2B

FROM: Kiersten Faulkner, Executive Director
Historic Hawaii Foundation
Kiersten@historichawaii.org
(808) 523-2900

RE: 'Ōpaeka'a, Pu'uopae, and Kapahi Bridge Design Presentation

Since 1974, Historic Hawai'i Foundation (HHF) has been a statewide leader for historic preservation. HHF's mission is to preserve and encourage the preservation of historic properties significant to the history of Hawai'i.

HHF has reviewed the design options submitted by KAI Hawai'i for the 'Ōpaeka'a, Pu'uopae, and Kapahi bridges. Both the 'Ōpaeka'a and Pu'uopae bridges are listed on the National Register of Historic Places (NHRP). The Kapahi bridge, while not listed on the register, is over fifty years old, and therefore its historic significance and integrity should be evaluated and weighed carefully when making planning decisions for this bridge.

The submittal from KAI Hawai'i to KHPRC lacked critical information that is needed to evaluate and provide meaningful comments on historic preservation issues. In particular, the applicant should provide:

1. A summary of the historic significance, character-defining features and elements of historic integrity (i.e. location, setting, design, materials, workmanship, association, feeling) for each of the bridges;
2. A summary of the design goals and issues that need to be addressed, which is the purpose, need and scope of the undertaking;
3. Their analysis of character-defining features, each alternative's effect on integrity, and how each alternative meets Secretary of Interior Standards for the Treatment of Historic Properties (SOI). They should identify which features are original, which would be retained and which are proposed for alteration/destruction. They should also present which elements of integrity would be affected by each of the alternatives.

Historic Hawaii Foundation • 629 Kalia Rd., Ste. 609 • Honolulu, HI 96911 • Tel: 808 523-2900 • Fax: 808 523-0290 • www.historichawaii.org

Historic Hawaii Foundation was established in 1974 to encourage the preservation of historic buildings, sites and archaeological resources of Hawai'i. As the statewide leader in historic preservation, HHF works to preserve the rich, unique architectural and cultural heritage and to ensure that historic preservation is an important element in the present and future quality of life, environmental sustainability and economic viability of the state.

D.3., D.4., D.5.

MAR 01 2012

HISTORIC HAWAII FOUNDATION

This information is necessary in order for the KHPRC, as well as county, state and federal agencies, and members of the public to understand each alternative's potential effect on historic properties and to provide input on ways in which the adverse effect may be avoided or minimized.

Although this basic and fundamental information was not provided, HHF has preliminary comments based on the alternatives provided.

HHF strongly encourages the long term maintenance and repair of these historic bridges. They should retain their current location, as moving any of them would destroy their historic character. They should also retain their character-defining features so that they retain their historic integrity. For all three bridges the current width is a feature that should be preserved. Widening these bridges would significantly impact their historic integrity and their eligibility for listing on the NHRP.

‘Ōpaeka‘a Bridge

One of ‘Ōpaeka‘a Bridge’s most visually distinctive features is the wrought iron truss system. It is imperative to maintain the historic trusses by repairing them where needed and replacing portions that are badly deteriorated with “in kind” materials. The Secretary of the Interior’s Standards for Rehabilitation set forth standards and guidelines for repairing historic buildings, structures, and objects. These standards allow for a property to change over time to meet the current needs of the structure, but also seek to ensure that the major character-defining features are identified and maintained during such changes.

For ‘Ōpaeka‘a Bridge, design option two is the only option that proposes retaining the existing bridge in its current location. While we have concerns regarding some aspects of this proposal, it is the best starting point for discussion. This option proposes to reuse existing steel trusses and to repair or replace only those members that are heavily damaged; clean and paint; retain the existing stone abutments; replace the existing concrete deck with a new one that is strong enough to carry emergency vehicles; make one or two lanes; and create an unprotected pedestrian sidewalk.

Retention and repair should be made with in-kind replacement of heavily damaged members, as well as retention of the existing stone abutments. This would maintain the overall historic appearance of the bridge. Should the concrete deck need to be replaced to increase its load-bearing capacity to accommodate emergency vehicles, we do not have concerns provided that its appearance remains the same as the existing asphalt concrete deck.

‘Ōpaeka‘a bridge should not be widened, as this would dramatically affect its historic integrity. The applicant should provide data on pedestrian usage of this bridge, as we question the need for a pedestrian sidewalk on this bridge and would like to see what data supports this need. The drawing submitted to the KHPRC depicts guard rails on the bridge deck inside the trusses. These distract from the historic appearance of the trusses and should be eliminated or redesigned.

Pu‘uopae Bridge

Historic Hawaii Foundation • 630 East Kalia Drive • Honolulu, HI 96817 • Tel: 808-524-2999 • Fax: 808-524-9900 • www.hif.org

Historic Hawaii Foundation was established in 1974 to encourage the preservation of historic buildings, sites and communities, on all the islands of Hawaii. It is the only statewide public preservation organization. HHF works to preserve, educate and promote historic and cultural resources and believes that historic preservation is an important element in the present and future quality of life, environmental sustainability and economic stability of the state.

HISTORIC HAWAII FOUNDATION

The most important aspects of Pu'uopae Bridge lie in its visual appearance and the contribution it makes to rural feeling of the area. It is important to maintain the bridge's existing width and abutments. We would prefer that the existing steel girders remain if they are in good condition, but do not have concerns with additional girders being added to carry the load of emergency vehicles.

Again, we question the necessity of creating a pedestrian sidewalk. This would almost certainly necessitate widening the bridge, which would dramatically affect its historic integrity.

Kapahi Bridge

The two options presented for this bridge both involve making it either one or two lanes; replacing steel girders; a new concrete deck; new steel or concrete railings; strengthening it to carry emergency vehicles; and both propose a pedestrian sidewalk. They differ in whether or not the sidewalk is protected.

The historic railings should be retained if still extant and able to be repaired. If the current railings are not historic, the new railings should not detract from the historic character of the area. Provided that it does not change the appearance, we do not have concerns regarding the replacement of steel girders or a new concrete deck. We again have concerns regarding the widening of the bridge and question the necessity of adding a pedestrian sidewalk.

Generally we feel that the plans submitted would need to be developed further to give a better understanding of the scope of the proposed projects. The options as submitted to the KHPRC do not provide enough information to know exactly what type of work is proposed. Information such as current and proposed width and length of the bridges; current and proposed railing height; and current and desirable weight limits would help to give a fuller understanding of the proposed projects.

Thank you for the opportunity to comment.

Very truly yours,



Kiersten Faulkner, AICP
Executive Director

Cc: Ross Stephenson & Angie Westfall, State Historic Preservation Division
Larry Dill, County of Kaua'i Engineer
Pat Phung, Federal Highways Administration
Mike Hummaman, KAHawaii
Tonia Moy, Fung Associates, Inc.

Historic Hawaii Foundation • 670 Kalia Rd. • Suite 100 • Honolulu, HI 96817 • Tel: 808 525 2999 • Fax: 808 525 0600 • www.hif.org

Historic Hawaii Foundation was established in 1974 to encourage the preservation of historic buildings, and to learn more about the rich history of Hawaii. As the executive leader for historic preservation, HIF is dedicated to the preservation of historic architecture and cultural heritage, and to the fact that historic preservation is an important element in the present and future quality of life, environmental sustainability, and economic vitality of the state.

NEIL ABERCROMBIE
GOVERNOR OF HAWAII



LORETTA J. FUDDY, A.C.S.W., M.P.H.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File:

12-060
Kapahi Bridge

April 3, 2012

Mr. Ron Terry, Principal
Geometrician Associates, LLC
P.O. Box 396
Hilo, Hawaii 96721

Dear Mr. Terry:

SUBJECT: Early Consultation for Environmental Assessment for Rehabilitation of Kapahi Bridge, Island of Kaua'i

The Department of Health (DOH), Environmental Planning Office (EPO), acknowledges receipt of your letter, dated March 30, 2012. Thank you for allowing us to review and comment on the subject document. The document was routed to the various branches of the Environmental Health Administration. We have no comments at this time, but reserve the right to future comments. We strongly recommend that you review all of the Standard Comments on our website: www.hawaii.gov/health/environmental/env-planning/landuse/landuse.html. Any comments specifically applicable to this application should be adhered to.

The United States Environmental Protection Agency (EPA) provides a wealth of information on their website including strategies to help protect our natural environment and build sustainable communities at: www.epa.gov/sustainability. The DOH encourages State and county planning departments, developers, planners, engineers and other interested parties to apply these strategies and environment principles whenever they plan or review new developments or redevelopments projects. We also ask you to share this information with others to increase community awareness on healthy, sustainable community design. If there are any questions about these comments please contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "Laura Leialoha Phillips McIntyre".

Laura Leialoha Phillips McIntyre, AICP
Environmental Planning Office Manager
Environmental Health Administration
Department of Health
919 Ala Moana Blvd., Ste. 312
Honolulu, Hawaii 96814
Phone: 586-4337
Fax: 586-4370
Email: laura.mcintyre@doh.hawaii.gov
Website: www.hawaii.gov/health/environmental

NEIL ABERCROMBIE
GOVERNOR OF HAWAII



WILLIAM J. AILA, JR.
CHAIRPERSON
WILLIAM D. BALFOUR, JR.
SUMNER ERDMAN
LORETTA J. FUDDY, A.C.S.W.,
M.P.H.
NEAL S. FUJIWARA
LAWRENCE H. MIIKE, M.D., J.D.
WILLIAM M. TAM
DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

April 5, 2012

Ref.: RFD.3502.2

Mr. Ron Terry
Geometrician Associates, LLC
P.O. Box 396
Hilo, HI 96721

Dear Mr. Terry:

Request for Determination
Rehabilitation of Kapahi Bridge, Kapaa (Kapahi) Stream
Kapaa, Kauai, TMKs: (4) 4-6-004:015 and (4) 4-6-005:006

We are responding to your March 30, 2012, letter to the Commission on Water Resource Management (Commission) requesting a determination for the proposed rehabilitation of the Kapahi Bridge across Kapaa (Kapahi) Stream in Kapaa, Kauai (TMKs: (4) 4-6-004:015 and (4) 4-6-005:006).

The Commission has the responsibility to protect stream channels from alteration whenever practicable to provide for fishery, wildlife, recreational, aesthetic, scenic, and other beneficial instream uses in the State of Hawaii under the authorization of the State Water Code (Code), Hawaii Revised Statutes (HRS), Chapter 174C, and Hawaii Administrative Rules Chapter 13-169 (Protection of Instream Uses of Water).

Under HRS §174C-71(3)(A), the Commission "shall require persons to obtain a permit from the Commission prior to undertaking a stream channel alteration." The term "stream channel" is defined as a "watercourse with a definite bed and banks which periodically or continuously contains flowing water." HRS §174C-3. The Code defines "stream" as any "natural watercourse in which water usually flows in a defined bed or channel."

Although the Code allows the maintenance of existing facilities, major repairs to the Kapahi Bridge may require a Stream Channel Alteration Permit (SCAP) for the project. Please provide additional information on the proposed scope of work and an environmental assessment for the proposed bridge rehabilitation so that the Commission can determine whether or not a SCAP will be required.

Please be advised that your proposal may require other agency approvals regarding wetlands, water quality, grading, stockpiling, and floodways. This letter should not be used for other regulatory jurisdictions or used to imply compliance with other federal, state, or county rules.

If you have any questions, please contact Robert Chong in the Stream Protection and Management Branch at (808) 587-0266, or toll free from the Big Island at 974-4000, extension 70266, or robert.k.chong@hawaii.gov.

Very truly yours,

A handwritten signature in black ink, appearing to read "William M. Tam".

WILLIAM M. TAM
Deputy Director



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122, Box 50088
Honolulu, Hawaii 96850

In Reply Refer To:
2012-CPA-0044
2012-CPA-0045
2012-CPA-0046

APR 06 2012

Mr. Ron Terry, Principal
Geometrician Associates, LLC
P.O. Box 396 Hilo, HI 96721

Subject: Request for Early Consultation for Draft Environmental Assessment for Puuopae, Kapahi, and Opaekaa Bridges Rehabilitation on Kauai Island, Hawaii.

Dear Mr. Terry:

This is a consolidated response to your three letters, all dated March 30, 2012, requesting early consultation and technical assistance on the subject bridge repairs. These actions will be partially funded by Federal Highway Administration (FHWA) and addressed through the National Environmental Policy Act (NEPA) process. Your specific request to the U.S. Fish and Wildlife Service (Service) was to identify concerns that should be evaluated and addressed in your Draft Environmental Assessment (DEA). The Service appreciates the opportunity to provide technical assistance early in the planning process so that impacts to trust resources can be avoided through project design, construction and operation.

These comments are provided under section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (ESA); the Fish and Wildlife Coordination Act of 1934 (16 U.S.C. 661 *et seq.*; 48 Stat. 401), as amended (FWCA); the Clean Water Act (33 U.S.C. 1251 *et seq.*; 62 Stat. 1155), as amended (CWA), and the NEPA.

Upon completion of your DEA, and as you initiate permit applications with the U.S. Army Corps of Engineers for work in waters or wetlands, or as FHWA provides funding to the project, the lead federal agency will request a species list and consultation with the Service under the ESA. Your request notes that areas of investigation will include but not be limited to: water quality assurance, wastewater treatment, flora, fauna, ecosystems and other environmental factors. Therefore, to assist you in your project planning; 1) survey recommendations (Attachment 1) are provided, as well as 2) recommended measures to avoid and minimize impacts to federally listed, endangered Hawaiian waterbirds, seabirds, and other possible trust resources in the project area (Attachment 2); and 3) to preserve aquatic habitat function, Best Management Practices are also

Mr. Ron Terry

2

recommended (Attachment 3) to incorporate into your design, construction and operational plans.

The DEA should include a description of the habitat within the project action area, and any measures that will be used to avoid or minimize impacts to listed species, and stream and riparian habitats. Upon request and review of the DEA or other coordination document submitted by the lead federal agency, species lists and consultation under ESA will be provided.

If you have any questions please contact Paula Levin at 808-792-9417. If you have any questions regarding endangered species or section 7 consultation, please contact Patrice Ashfield at 808-792-9400.

Sincerely,



For Loyal Mehrhoff
Field Supervisor

Enclosure (3)

Cc: FHWA

Attachment 1. Waterbird Survey Recommendations:

The Hawaiian duck (*Anas wyvilliana*), Hawaiian coot (*Fulica alai*), Hawaiian common moorhen (*Gallinula chloropus sandvicensis*), and Hawaiian stilt (*Himantopus mexicanus knudseni*) (collectively referred to as "Hawaiian waterbirds") were federally listed as endangered under the Endangered Species Conservation Act of 1968, later replaced by the Endangered Species Act (ESA) of 1973, as amended [16 U.S.C. 1531 *et seq.*] The Recovery Plan for Hawaiian waterbirds was finalized in 1978, and revised in 1985. A draft Revised Recovery Plan for Hawaiian waterbirds was published in August, 2005 (USFWS 2005) and is available online at <http://www.fws.gov/pacific/ecoservices/endangered/recovery/documents/HawaiianWaterbirdsDraftRevRecoveryPlan5-05.pdf>.

The U.S. Fish and Wildlife Service (Service) works with project proponents to address potential impacts to federally listed species and their habitats. Surveys should be conducted for projects that may impact wetlands or waterways to determine whether endangered Hawaiian waterbirds are present.

- Each project site should be surveyed multiple times. Small wetlands, ponds, or streams (less than 10 acres) should be surveyed a minimum of four times during a period of three weeks.
- All surveys should be conducted between sunrise and noon.
- If the proposed project site is intermittently wet, or an ephemeral wetland, surveys should be timed so that they occur when water is present at the site.
- Monitors should spend a minimum of 30 minutes at the site per visit. If the site is large, or if Hawaiian waterbirds are observed, monitors should plan to spend more time surveying the area to determine use (i.e., foraging, nesting, breeding, etc.).

If endangered Hawaiian waterbirds are present at a project site, survey details and results, as well as a description of the habitat (e.g., type of vegetation, water depth, size of wetland, etc.) should be submitted to the Service. Additional surveys may be needed prior to the start of the project to determine the seasonality of Hawaiian waterbird presence and whether breeding activity occurs within the area.

Attachment 2. Avoidance and Minimization Measures

1. All on-site project personnel should be apprised that they are working in an environmentally sensitive area and that endangered Hawaiian waterbirds may be in the vicinity of the project.
2. If any federally protected species appears in the project area, work activity should be temporarily suspended until the bird leaves the area of its own accord.
3. If bird surveys indicate the Hawaiian waterbirds are present in the vicinity of the project site, nest surveys should be conducted immediately prior to starting work, and after any subsequent delay of three or more days. If a waterbird nest is discovered, all work in the area should cease and our office should be contacted immediately.
4. To prevent impacts to seabirds, no night time construction activities or construction lights should be allowed. Any permanent street lighting should be fully shielded. If the proposed project involves the installation or movement of existing utility lines, please contact our office with project details so we may assist you in determining potential adverse impacts to listed seabird species.
5. Hawaiian hoary bats may be present in the area, roosting in both exotic and native woody vegetation. They leave their young unattended in "nursery" trees and shrubs when they forage. If trees or shrubs suitable for bat roosting are cleared during the bat breeding season (May to August), there is a risk that young bats could inadvertently be harmed or killed. To minimize impacts to the endangered Hawaiian hoary bat, woody plants greater than 15 feet (4.6 meters) tall should not be removed or trimmed during the bat birthing and pup rearing season (June 1 through September 15).

Attachment 3. Best Management Practices to Conserve Aquatic Habitat Functions

The following Best Management Practices (BMPs) should be implemented to protect water quality, reduce runoff, erosion and sedimentation to the streams.

1. It is understood that all proposed bridge rehabilitation actions are intended to span each watercourse and that no in-water work is planned, or impacts to the stream beds proposed. Please ensure the design plans clearly reflect your intention to conserve the maximum amount of stream and riparian habitat for native stream species, by avoiding placement of fill or structures in the stream for temporary diversion or construction purposes, and minimizing any stream hardening (including concrete channelization) associated with the bridge replacement or restoration of the stream bed.
2. If temporary culverts and associated fill are proposed for construction in dry conditions, culverts and associated fill should be removed and the stream area restored once construction is complete. Whether temporary or permanent culverts will be used, the Service recommends the plans include appropriately sloped and textured apron or similar structure beneath these culverts on both ends, to facilitate constant flow and to prevent vertical drop or scour-hole formation on either the up- or downstream ends of the culverts that would inhibit migration of stream species.
3. Design plans should include only native or non-invasive vegetation to be used for proposed riparian plantings on reinforced stream banks and drainage swales.
4. Design plans should indicate how storm runoff will be managed to dissipate the energy of the flow and reduce bank erosion, and to minimize introduction of roadway contaminants to the stream. Construction and operation of the rehabilitated bridges should contain measures to capture, filter, or treat sediments and/or contaminants associated with stormwater runoff. Although these concerns may be addressed through your NPDES permit review process, we recommend incorporating storm water management in this project to protect the water quality and habitat functions of the stream.
5. The upper parts of the Kalama, Kapahi, and Opaekaa Streams sustain perennial surface flow and under certain flood conditions, connection to tidal waters, therefore providing potential habitat for native fish and mollusk species that could access the upper stream. Work should be timed and designed for construction in low flow periods and to avoid temporary or permanent impairment of this connectivity.
6. To improve stream habitat conditions including water temperature, please replace any removed or disturbed native riparian vegetation on streambanks that were stabilized or otherwise impacted by construction.
7. All project-related materials and equipment (dredges, barges, backhoes, etc.) will be cleaned of pollutants prior to use.
8. No project-related materials (fill, revetment rock, pipe, etc.) will be stockpiled in the

water (intertidal zones, reef flats, stream channels, wetlands, etc.) or where they could be washed into the water from adverse weather or tidal conditions. Stockpiling of any materials, during project implementation, will be located a minimum of 50 meters away from buffer zones or areas of potential runoff. All stockpiles will be removed or covered and protected with soil stabilization measures, and a temporary perimeter sediment barrier, prior to the onset of precipitation.

9. All debris removed from the environment will be disposed of at an approved upland landfill site.
10. No contamination (trash or debris disposal, alien species introductions, etc.) of adjacent terrestrial or marine/aquatic environments (reef flats, channels, open ocean, stream channels, wetlands, etc.) shall result from project-related activities.
11. Fueling of project-related vehicles and equipment should take place away from the water and a contingency plan to control petroleum products accidentally spilled during the project shall be developed. Absorbent pads and containment booms shall be stored on-site, if appropriate, to facilitate the clean-up of accidental petroleum releases.

Erosion Control

1. An erosion control and restoration plan to control short-term and long-term erosion and sedimentation effects should be implemented. The plan should include all the necessary local jurisdiction requirements regarding erosion control and will implement Best Management Practices for erosion and sediment control as required.
2. Erosion control devices should be monitored on a weekly basis and augmented as necessary if new erosion points are discovered. In the event of pending storms, erosion control devices will be inspected to ensure that such devices are in place and are functional. If erosion control devices are found to be non-functional, they should be repaired within 24 hours. Monitoring and maintenance of erosion control devices and adjacent disturbed areas should continue during and immediately after significant storm events.
3. Turbidity and siltation from project-related work should be minimized and contained within the vicinity of the site through the appropriate use of effective silt containment devices and the curtailment of work during adverse weather or tidal conditions.

NEIL ABERCROMBIE
GOVERNOR OF HAWAII



LORETTA J. FUDDY, A.C.S.W., M.P.H.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File:

LUD - 4 4 6 004 -ID955
Rehab Kapahi Bridge

April 11, 2012

Mr. Ron Terry, Principal
Geometrician Associates, LLC
P.O. Box 396
Hilo, Hawaii 96721

Dear Mr. Terry:

Subject: Early Consultation for Environmental Assessment for Rehabilitation of Kapahi Bridge on Kawaihau Road between Moalepe Road and Kahuna Road Wailua, Island of Kauai 96746 TMK (4) 4-6-004: 001

Thank you for the opportunity to provide comments on the subject project. We have no comments to provide at this time since the project scope does not involve the design and construction of a domestic wastewater treatment system.

Should you have any questions, please contact the Planning & Design Section of the Wastewater Branch at our direct toll free phone number 274-3141 ext. 64294 or fax to (808) 586-4300.

Sincerely,

A handwritten signature in black ink, appearing to read "Marshall Lum".

MARSHALL LUM, P.E., ACTING CHIEF
Wastewater Branch

LM:cle

c: Ms. Lori Vetter – DOH/WWB – Kauai Office
Environmental Planning Office (EPO-12-060)

NEIL ABERCROMBIE
GOVERNOR OF HAWAII



WILLIAM J. AHLA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

April 30, 2012

Geometrician Associates, LLC
Attention: Mr. Ron Terry
P.O. Box 396
Hilo, Hawaii 96721

via email: rterry@hawaii.rr.com

Dear Mr. Terry:

SUBJECT: Early Consultation for Environmental Assessment for Rehabilitation of Kapahi Bridge, Island of Kaua'i

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR) Land Division distributed or made available a copy of your letter pertaining to the subject matter to DLNR Divisions for their review and comments.

At this time, enclosed are comments from (1) Land Division - Kauai District; and (2) Commission on Water Resource Management, on the subject matter. No other comments were received as of the suspense date. Should you have any questions, please feel free to call Supervising Land Agent Steve Molmen at 587-0439. Thank you.

Sincerely,

A handwritten signature in black ink, appearing to read "Russell Y. Tsuji".

Russell Y. Tsuji
Land Administrator

Enclosures

RECEIVED
LAND DIVISION

geometrician
ASSOCIATES, LLC
integrating geographic science and planning

2012 APR -2 A 9 22

DEPT. OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

phone: (808) 969-7090 fax: (866) 316-6988 PO Box 396 Hilo Hawaii 96721
rterry@hawaii.rr.com

March 30, 2012

Dear Agency/Organization Official:

**Subject: Early Consultation for Environmental Assessment for
Rehabilitation of Kapahi Bridge, Island of Kaua'i**

I am in the process of preparing a Draft Environmental Assessment (DEA) for a proposed federal aid County of Kaua'i activity that involves rehabilitation of Kapahi Bridge. The bridge crosses Kapahi Stream on Kawaihau Road, between Moalepe and Kahuna Roads (see attached maps and photos).

Among other deficiencies, the bridge has damaged timber posts and railings, corroded girders, undermined abutments, and an unsupported guardrail. A tree that fell during the severe storm of March 2012 further damaged the bridge. The bridge cannot support loads over 5 tons, which means that school buses, fire trucks, and many other large vehicles cannot cross it, causing ongoing detours of up to 3 miles and associated inconvenience and expense. If major repairs are not conducted, the County will be forced for safety reasons to close the bridge, leading to serious inconveniences for residents and businesses.

The bridge was built in 1937 and its historical value is being researched and will be reported as part of the EA. The proposed rehabilitation is being designed to preserve the character of the bridge, as practical. If appropriate, the EA will evaluate avoidance alternatives per Section (4) requirements of the U.S. Department of Transportation. The project would also relocate overhead utility lines and will either leave in place or relocate water lines.

The EA process will be in compliance with the Hawai'i Environmental Policy Act, Chapter 343, HRS, and administrative rules at Title 11, Chapter 200, HAR. The project will be partially funded by the Federal Highway Administration (FHWA) and therefore the EA also needs to comply with the National Environmental Policy Act (NEPA) and implementing regulations thereof at 40 CFR Parts 1500 through 1508 and 23 CFR 771, as well as other relevant federal environmental laws and policies.

The areas of investigation in the Environmental Assessment will include but not be limited to the following: water quality assurance; wastewater treatment; flora, fauna, and

TOPOI map printed on 03/25/12 from "Untitled.tpo"

447000m E. 445000m E. 449000m E. 452000m E. 456000m E. 459000m E. 463000m E. 466000m E. WGS84 Zone 4Q 475000m E.



10°

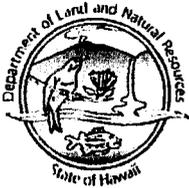
447000m E. 445000m E. 449000m E. 452000m E. 456000m E. 459000m E. 463000m E. 466000m E. WGS84 Zone 4Q 475000m E.

Map created with TOPOI & C.OO2 National Geographic (www.nationalgeographic.com/topo)

NE H. ABERCROMBIE
GOVERNOR OF HAWAII



WILLIAM J. AHA, JR.
DIRECTOR
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

2012 APR 25 A 9 22

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

DEPT. OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

April 4, 2012

MEMORANDUM

TO:

DLNR Agencies:

- Div. of Aquatic Resources
- Div. of Boating & Ocean Recreation
- Engineering Division
- Div. of Forestry & Wildlife
- Div. of State Parks
- Commission on Water Resource Management
- Office of Conservation & Coastal Lands
- Land Division - Kaua'i District
- Historic Preservation

FROM:

Russell Y. Tsuji
Russell Y. Tsuji, Land Administrator

SUBJECT:

Early Consultation for Environmental Assessment for Rehabilitation of Kapahi Bridge, Island of Kaua'i

LOCATION:

Kapahi Bridge, Island of Kaua'i, TMK (4) 4-6-04

APPLICANT:

Geometrician Associates, LLC for the County of Kaua'i

Transmitted for your review and comment on the above-referenced document. We would appreciate your comments on this document. Please submit any comments by April 26, 2012.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

- We have no objections.
- We have no comments.
- Comments are attached.

Signed: *Steve Molmen*
Date: 4/16/12

4/15/12 05

cc: Central Files

APR 9 12

DLNR KDLB (330)

4/20/12

NEIL ABERCROMBIE
GOVERNOR OF HAWAII



WILLIAM J. AHL, JR.
COMMISSIONER
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

April 4, 2012

MEMORANDUM

RECEIVED
LAND DIVISION
2012 APR 12 P 3 07
DEPT. OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

2012 APR -9 AM 10:26
501-555-5555

TO:

DLNR Agencies:

- Div. of Aquatic Resources
- Div. of Boating & Ocean Recreation
- Engineering Division
- Div. of Forestry & Wildlife
- Div. of State Parks
- Commission on Water Resource Management
- Office of Conservation & Coastal Lands
- Land Division - Kaua'i District
- Historic Preservation

FR

to

FROM:

Russell Y. Tsuji, Land Administrator

SUBJECT:

Early Consultation for Environmental Assessment for Rehabilitation of Kapahi Bridge, Island of Kaua'i

LOCATION:

Kapahi Bridge, Island of Kaua'i, TMK (4) 4-6-04

APPLICANT:

Geometrician Associates, LLC for the County of Kaua'i

Transmitted for your review and comment on the above-referenced document. We would appreciate your comments on this document. Please submit any comments by April 26, 2012.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

- We have no objections.
- We have no comments.
- Comments are attached.

More info required

Signed:

R. Tsuji

Date:

4/10/12

cc: Central Files

FILE ID:	RFD 3562.2
DOC ID:	9128 ✓

NEIL ABERCROMBIE
GOVERNOR OF HAWAII



LORETTA J. FUDDY, A.C.S.W., M.P.H.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File:

April 28, 2012

Mr. Ron Terry
Geometrician Associates, LLC
P.O. Box 396
Hilo, HI 96721

Dear Mr. Terry:

This correspondence is in response to your request for comments to the pre-Environmental Assessment for the Rehabilitation of Kapahi Bridge Project, Kauai.

Project activities shall comply with the following Administrative Rules of the Department of Health:

- Chapter 11-46 Community Noise Control

Should you have any questions, please contact me at (808) 586-4701.

Sincerely,

A handwritten signature in black ink, appearing to read "Jeffrey M. Eckerd".

Jeffrey M. Eckerd
Program Manager
Indoor and Radiological Health Branch

NEIL ABERCROMBIE
GOVERNOR OF HAWAII



WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

June 1, 2012

Geometrician Associates, LLC
Attention: Mr. Ron Terry
P.O. Box 396
Hilo, Hawaii 96721

via email: rterry@hawaii.rr.com

Dear Mr. Terry:

SUBJECT: Early Consultation for Environmental Assessment for Rehabilitation of Kapahi Bridge, Island of Kaua'i

Thank you for the opportunity to review and comment on the subject matter. In addition to the comments previously sent you on April 30, 2012, enclosed are comments from the Historic Preservation Division on the subject matter. Should you have any questions, please feel free to call Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Sincerely,

A handwritten signature in black ink, appearing to read "Russell Y. Tsuji".

Russell Y. Tsuji
Land Administrator

Enclosures

NEIL ABERCROMBIE
GOVERNOR OF HAWAII



WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

GUY H. KAULUKUKUI
FIRST DEPUTY

WILLIAM M. TAM
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCE
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
ENVIRONMENTAL AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAIKOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS



RECEIVED
LAND DIVISION
2012 MAY 31 A 10:11
DEPARTMENT OF LAND & NATURAL RESOURCES
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
HISTORIC PRESERVATION DIVISION
KAHUIHIEWA BUILDING
601 KAMOKILA BLVD. KAPOLEI HI 96707

DATE: May 14, 2012 **LOG:** 2012.1021
DOC: 1205RS32

TO: Steve Molmen
Land Division, Department of Land and Natural Resources
Post Office Box 621
Honolulu, HI 96809

SUBJECT: National Historic Preservation Act (NHPA) Section 106 Consultation
Permit # (None)
Owner: County of Kauai
Location: Kapahi Stream, Kawaihau Road, Kauai
Tax Map Key: (4) 4-6-004

Date Received by SHPD: April 4, 2012

Description of Project/Undertaking: Early consultation for Environmental Assessment for rehabilitation of Kawaihau Road Bridge over Kapahi Stream.

Area of Potential Effect (APE): Present bridge footprint, approaches, and possible realignment to connect with Piliamoo Road

Description of Resource: Originally constructed in 1937. The bridge currently consists of rubble abutments, steel girders, and timber decking.

Eligibility: Although the bridge has been altered over time (it apparently began with timber stringers, retains a timber deck and has the original abutments (*Historic Bridge Inventory, Island of Kauai*, Spencer Mason Architects, 1988), the dates of the changes made are unknown. Eligible for the Hawaii Register of Historic Places under Criteria A (Events – homesteading) and C (Architecture).

Documentation Received: Two maps, photograph of bridge from downstream

SHPD Determination: SHPD would prefer construction that retains the look and feel of the existing bridge while meeting the need for emergency vehicle access. This would include matching the existing bridge width, rehabilitated steel girders, a timber covered concrete deck, railings that match those existing, and undifferentiated pedestrian use. We attended an April public hearing and continue to welcome consultation with the County and Federal Highway Administration on this project.

Any questions should be addressed to Ross W. Stephenson, SHPD Historian, at (808) 692-8028 (office), (808) 497-2233 (cell) or ross.w.stephenson@hawaii.gov.

Mahalo for the opportunity to comment.

Angie Westfall
Architecture Branch Chief, Hawaii Historic Preservation Division

NEIL ABERCROMBIE
GOVERNOR OF HAWAII



LORETTA J. FUDDY, A.C.S.W., M.P.H.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. Box 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:
File:
12-453A CAB

May 29, 2012

Mr. Ron Terry
Principal
Geometrician Associates, LLC
P.O. Box 396
Hilo, Hawaii 96721

Dear Mr. Terry:

SUBJECT: Early Consultation for Environmental Assessment for
Rehabilitation of Kapahi, Opaekaa and Puuopae Bridges on Kauai

A significant potential for fugitive dust emissions exists during all phases of construction. The proposed activities will occur in proximity to public areas and thoroughfares, thereby exacerbating potential dust problems. The activities must comply with the provisions of Hawaii Administrative Rules, §11-60.1-33 on Fugitive Dust.

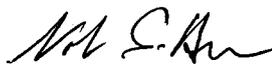
We encourage the contractor to implement a dust control plan, which does not require approval by the Department of Health, to comply with the fugitive dust regulations.

Dust control measures include, but are not limited to, the following:

- a) Planning the different phases of construction, focusing on minimizing the amount of dust-generating materials and activities, centralizing on-site vehicular traffic routes, and locating potential dust-generating equipment in areas of the least impact;
- b) Providing an adequate water source at the site prior to start-up of construction activities;
- c) Landscaping and providing rapid covering of bare areas, including slopes, starting from the initial grading phase;
- d) Minimizing dust from shoulders and access roads;
- e) Providing adequate dust control measures during weekends, after hours, and prior to daily start-up of construction activities; and
- f) Controlling dust from debris being hauled away from the project site. Also, controlling dust from daily operations of material being processed, stockpiled, and hauled to and from the facility.

If you have any questions, please contact Mr. Barry Ching of the Clean Air Branch at (808) 586-4200.

Sincerely,


NOLAN S. HIRAI
Acting Manager, Clean Air Branch

BC:rg

c: Environmental Planning Office

Aloha Ron- The Office of Hawaiian Affairs is in receipt of your three (3) March 30, 2012 letters seeing comments ahead of draft environmental assessments (DEA) which will be prepared to support the rehabilitation of the Puu 'Opae, 'Opaekaa and Kaphai bridges (projects) on the Island of Kaua'i. Please see the attached letter, which OHA has sent to another consultant who we understand is preparing a cultural impact assessment (CIA) for these projects. Some of our CIA comments may be applicable to the DEA. It seems that Puu 'Opae and 'Opaekaa are both listed on the National Register of Historic Places. While OHA does not assign significance to these historic properties, other organizations with demonstrated expertise and knowledge in these resources might. OHA suggests that you contact Kiersten Faulkner, Executive Director of the Historic Hawai'i Foundation and seek comments from them.

Please send us electronic copies of the DEA on CD to OHA attn.: Compliance Monitoring Program when they are prepared.

Thanks, Keola

Keola Lindsey
Office of Hawaiian Affairs
Compliance Program
711 Kapiolani Boulevard
Honolulu, Hawai'i 96813
Phone: (808) 594-0244
Email: keolal@oha.org



STATE OF HAWAII
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAII 96813

HRD11/6055

February 1, 2012

Cathleen Dagher, Senior Archaeologist
Scientific Consultant Services, Inc.
711 Kapi'olani Boulevard, Suite 975
Honolulu, Hawai'i 96813

**Re: Pre-Cultural Impact Assessment Consultation
Bridge Replacements
Island of Kaua'i**

Aloha e Cathleen Dagher,

The Office of Hawaiian Affairs (OHA) is in receipt of your December 12, 2011 and January 3, 2012 letters requesting comments ahead of a cultural impact assessment (CIA) which will be prepared to support the replacement of three existing bridges (the project) on the Island of Kaua'i: Pu'u 'Ōpae Bridge, 'Ōpaeka'a Bridge and the Kapahi Bridge (bridges).

The statement in your letter *that archaeological reports of studies conducted in the areas of these bridges can be found on file at the State Historic Preservation Division (SHPD) Office* seems to imply that it is our responsibility to go to the SHPD office to review these reports to determine whether there are historic properties of significance to the Hawaiian people identified within the project. If this is indeed what you are suggesting, OHA finds this to be unacceptable. In traditional Hawaiian thinking, archaeological resources are cultural resources and thus, we believe it is your responsibility to provide a summary of identified cultural sites within or in the vicinity of the project area to consulting parties.

The reference in your letter to applicability of the requirements of the National Environmental Policy Act (NEPA) indicates that there is a federal nexus to this project and we request specific clarification what this federal nexus is. If the requirements of the NEPA are applicable to this project, then we would expect that the requirements of the National Historic Preservation Act (NHPA) are also applicable. Section 106 of the NHPA requires that the "lead federal agency" initiate consultation with interested parties, including Native Hawaiian Organizations and that a "good faith effort" to identify historic properties within the project area be completed.¹ Our ability to assess whether such a "good faith effort" has indeed been completed is dependant on the information within the "archaeological reports" on file with the SHPD being summarized and provided to OHA and other consulting parties.

¹ See NHPA implementing regulations 36 CFR §800.2-4.

Cathleen Dagher, Senior Archaeologist
Scientific Consultant Services, Inc.
February 1, 2012
Page 2 of 2

If U.S. Department of Transportation involvement in this project provides the federal nexus and "trigger" for applicable federal statutes and regulations, then the requirements of the U.S. Department of Transportation Act, including a Section 4(f) evaluation will also be applicable. We note that your letter confirms that the Pu'u 'Ōpae Bridge and 'Ōpae'ka'a Bridge are both listed on the National Register of Historic Places (NRHP). While OHA does not assign significance to these NHRP listed historic properties, we do encourage you to initiate consultation with organizations that do.

Thank you for the opportunity to provide comments at this early stage. We look forward to receiving our requested clarifications. Should you have any questions or concerns, please contact Keola Lindsey at 594-0244 or keolal@oha.org.

'O wau iho nō me ka 'oia 'i'o,



Richard Pezzulo
Interim Chief Executive Officer

RP:kl

C: OHA, Kaua'i Community Outreach Coordinator

TO WHOM IT MAY CONCERN:

Thank you for hearing my testimony, however, I am unable to present this in person. With respects, please allow the following letter into your records and be read publicly:

I am a 13 year resident of Kauai and would support the immediate upgrade and/or replacement of one-lane bridges across the island. More specifically, I am a parent of an 18 year old driver and a newly licensed 16 year old driver. It would please my family if the government powers decide post-haste to improve Kauai's roadways by replacing one-lane bridges with two-lane bridges. It is common knowledge today that the existing one-lane bridges pose a danger for modern travelers on the roadways of this county.

There was a time for these bridges, but those days are gone. Additionally, consider this perspective:

From the County of Kauai Charter:

ARTICLE II, POWERS OF THE COUNTY, Section 2.01. Powers: "To promote the general welfare and the safety, health, peace, good order, comfort and morals of its inhabitants, the county shall have and may exercise all powers necessary for local self government..." Safety is at or near the top of all our founding documents. This word in the County of Kauai Charter is profound and if you look to parallel language of both the Hawaii State Constitution and The United States Constitution you will find the same emphasis for safety.

Government appears to heap '**safety** of its citizenry' atop its priority list time and again. And it should. *Safety* is about the only thing government is for. That, and building good roads. So I do sincerely hope this testimony finds good company. But beyond that I believe government has, over time, reached beyond its natural scope. You hear it every day in the language of the politician.

When elected officials and their tax-funded emissaries wax poetic on the public dime orating the likes of "cultural values" or "win-win tourism opportunity" or "revenue streams of the public golf course" or that "Kauai's one-lane bridges are untouchable historic treasures", I ponder whether these "representatives" have lost sight of the core-goal and purpose of the Republic.

Please indulge me this reference, so that the many other aspect of bridge building are an aside for a moment.

Therefore the central argument put to me whether or not the loss to a handful of community members and at least one Council Person "historical one-lane bridges" as a greater burden to the people than a statistical fact-- that replacing these one-lane bridges with two-lane bridges provides *more safety* for commuter-constituents.

Yes, the statistics do not lie. Two-lane bridges are far safer and therefore I implore the government to proceed.

But, this discussion becomes then a philosophical debate about 'one-lane historical bridges'-- beautiful in their familiarity, old-time tradition and nostalgia **versus** a plainly- rational, two-lane, modern bridge construct, built for practicality, efficiency, and, first and foremost, *safety*.

Why, that's the main purpose of a bridge is it not?- to get us across an otherwise dangerous expanse *safely*. Whether or not that bridge's aesthetics resonates over time in the nostalgic-heart becomes secondary. Who's to say? Perhaps the gentle people in time-- including those here today arguing for nostalgia, will grow to endear the two-lane bridge just as they love today's one-lane bridge.

And so, should there then be any question in the office of government barring some great public outcry? No.

And I ask you, in light of *safety*-- a duty of government-- does not the appeal to aesthetics pale? If my argument falls short and the one-lane bridges prevail based solely on this point, have we failed so in the name of vanity, not *safety*?

All issues being equal in consideration of the financial burden to the tax-payer, I support the construction of the two-lane bridges for Kauai.

The sooner, the better, and for our safety.

Mahalo,

Rolf Bieber

5015 Malie Rd. Kapaa, HI 96746/ 821-2194

Glenn Mickens' Testimony----Bridges 12/7/11

It appears that we are now redoing or duplicating what we did or tried to do in 2003-2004---rebuild or put in a new Puuopae and Opaekaa bridge.

I have documented E Mails from Alvin Takeshita, State Traffic Engineer and KPD officer Kaauwai along with Chief Lum in 04 showing that on Kauai there are 3 times more accidents on 1 lane bridges than on 2 lane bridges.

The Feds would only fund a bridge if it were built to their standards and two lanes were one of their mandatory requirements.

In 04 these bridges were 80% ready to be rebuilt but a group of people got them put on the Historical Register and stopped the process. Since the Fed funds were time sensitive we, the tax payers forfeited \$189,600 of the design phase funds.

The actual cost of building these bridges today---contingent on the type we use (the Olohena Bridge costing us \$4.8 million to build it over a ditch whereas the Acrow type used over the Wailua River would have cost us well under a million dollars) will probably be 5 times more than it would have in 04.

So, my questions to you are: why are we having these duplicate meetings today that we had 8 years ago?; what type of bridges are we proposing to build?; are the Feds still mandating that 2 lanes are used for their 80% funding?; does the county have the funding to do this project with or without the Feds funding?; with safety for school buses and emergency vehicles and statistics listed above, will we ignor them and still build these bridges one lane for historical purposes?

Your answers will be appreciated.

⑥ 9 ⑦

Tue, Oct 19, 2004 8:26 AM

From: KC Lum <KCLum@kauai.hawaii.gov>
To: Glenn Mickens <rmk@aloha.net>
Date: Monday, October 18, 2004 6:48 PM
Subject: FW: Bridges

FYI

-----Original Message-----

From: Joseph Kaauwai
Sent: Tuesday, October 12, 2004 8:40 AM
To: KC Lum
Subject: Bridges

We have checked with the information available to the Traffic Safety Unit and do concur with the findings of the State of Hawaii, Department of Transportation, State Traffic Engineer, Alvin TAKESHITA.

The information that the State Of Hawaii is giving to Mr. MICKENS was obtained through this office, this information only reflects the major traffic crashes in these areas, and not the minor crashes.

5

KCLUA

Fri, Apr 30, 2004 1:16 PM

From: Alvin.Takeshita@hawaii.gov

To: <rmk@aloha.net>

Cc: <Rodney.Haraga@hawaii.gov>, <Grace.Ichikawa@hawaii.gov>, <Glenn_Yasui@exec.state.hi.us>, <Wilhelmina_Bartolome@exec.state.hi.us>, <Scott.Ishikawa@hawaii.gov>, <Steven_Kyono@exec.state.hi.us>

Date: Wednesday, April 28, 2004 11:33 AM

Subject: PUBLIC INQUIRY: One/Two Lane Bridges on Kauai (Glenn Mickens)

(Sent to KC Sun 10/6/04 asking for his verification of these figures)

Aloha Glenn,

I have been asked to help you with your inquiry regarding safety for 1 or 2 lane bridges on Kauai.

Our traffic accident records verify that two-lane bridges on Kauai are safer than one-lane bridges. There are 12 one-lane bridges and 39 two-lane bridges on Kauai. Our statistics show that historically on Kauai, there are about 3 times more accidents per bridge at one-lane bridges than two-lane bridges. It is interesting to note that almost 50% of accidents that occurred on the 12 one-lane bridges occurred at Hanalei Bridge. We speculate that heavy tourist traffic contributed heavily to this statistic. One third of drivers had out-of-state driver licenses.

From an engineering standpoint, the two-lane bridges are safer because they are wider, provide more clearance with bridge railings, and do not create vehicle conflicts caused by one-lane bridges, where vehicles traveling in opposite directions must yield. It should also be noted that one-lane bridges tend to be older bridges that do not have the latest engineering safety features enjoyed by newer structures.

If there are any questions, please feel free to e-mail me at: Alvin.Takeshita@Hawaii.Gov

Mahalo,
Alvin Takeshita
State Traffic Engineer

From: Alvin.Takeshita@hawaii.gov
Subject: **Re: One-Lane Bridges on Kauai**
Date: December 30, 2011 3:13:24 PM HST
To: glennruth@hawaiiantel.net
Cc: Jan.Higaki@hawaii.gov, Sean.Hiraoka@hawaii.gov

Aloha Glenn,

Thank you for your request of Dec. 15, 2011, regarding accidents at 1-lane versus 2-lane bridges.

As requested, we used more recent accident data (years 2004 - 2009) to update our prior findings for Kauai. The major accidents used for this study were located through a bridge inventory provided by our Bridge Design Section. Accidents that were reported at other locations (other than what was provided by our Bridge Design Section) or couldn't be clarified as one-lane or two-lanes were not counted.

We found that there are still more major traffic accidents occurring on 1-lane bridges versus 2-lane bridges. This study was conducted on 12 1-lane bridges and 41 2-lane bridges on Kauai. We found that 1-lane bridges had a rate of 2.33 accidents per bridge and 2-lane bridges had a rate of 1.24 accidents per bridge. The accidents occurring at 1-lane bridges are close to twice as much as at 2-lane bridges. Hanalei Bridge contributes to 50% of the accidents that occurred at the 1-lane bridges used for this study.

Through my previous years of traffic engineering experience and verified by this recent study update, it is understandable that 1-lane bridges would have traffic flow operational concerns. The study verifies that 1-lane bridges have a higher accident rate than 2-lane bridges.

If there are any questions, please feel free to contact my Traffic Safety staff at 692-7684.

Alvin Takeshita
Interim Administrator
Highways Division

This e-mail message, including any attachments, is for the sole use of the intended recipient(s) and may contain confidential and/or privileged information. Any review, use, disclosure, or distribution by unintended recipients is prohibited. If you are not the intended recipient, please contact the sender by reply e-mail and destroy all copies of the original message.



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
FORT SHAFTER, HAWAII 96858-5440

REPLY TO
ATTENTION OF:

June 19, 2012

Regulatory Branch

POH-2012-00101

Geometrician Associates, LLC
Attn: Ron Terry
PO Box 396
Hilo, HI 96721

Dear Mr. Terry:

We have received your request dated March 30, 2012, for the Department of the Army to review and comment on the proposed Kapahi Bridge rehabilitation on Kawaihau Road in Kapaa, Kauai. We have assigned the project the reference number **POH-2012-00101**. Please cite this reference number in any correspondence with us concerning this project. We have completed our review of the submitted document and have the following comments:

Section 10 of the Rivers and Harbors Act of 1899 (Section 10) requires that a Department of the Army (DA) permit be obtained from the U.S. Army Corps of Engineers (Corps) prior to undertaking any construction, dredging, and other activities occurring in, over, or under navigable waters of the U.S. For tidal waters, the shoreward limit of the Corps' jurisdiction extends to the Mean High Water Mark. Section 404 of the Clean Water Act (Section 404) of 1972 (33 U.S.C. 1344) requires that a DA permit be obtained for the **discharge, or placement, of dredge and/or fill material** into waters of the U.S., including wetlands. For tidally influenced waters, in the absence of adjacent wetlands, the shoreward limit of the Corps' jurisdiction extends to the High Tide Line, which in Hawaii may be approximated by reference to the Mean Higher High Water Mark. For non-tidal waters, the lateral limits of the Corps' jurisdiction extend to the **Ordinary High Water Mark** or the approved delineated boundary of any adjacent wetlands.

The perennial, **Kapahi Stream**, with end terminus in the Pacific Ocean, **is a water of the U.S., subject to Corps jurisdiction**. Based on our review of the submitted documents, it is unclear if the proposed bridge rehabilitation will result in the discharge of fill material. If the project results in the discharge of fill material into the Kapahi Stream, a Section 404 permit may be required.

If the project design should change and work is to be proposed in wetlands, streams, drainage ditches, the Pacific Ocean, or other aquatic resource, including the Kapahi Stream, (whether or not water is present in that resource during project construction) please contact our office to request a jurisdictional determination. We can then determine if any regulatory requirements apply to work that may impact those resources.

Thank you for contacting us regarding this project. We look forward to working with you on this project as well as any future projects. Should you have any questions, please contact Kaitlyn Seberger, at (808) 835-4300 or via email at Kaitlyn.R.Seberger@usace.army.mil.

Sincerely,

A handwritten signature in black ink, appearing to read "George P. Young". The signature is fluid and cursive, with a large, sweeping flourish at the end.

George P. Young, P. E.
Chief, Regulatory

KAPAHI BRIDGE REHABILITATION ENVIRONMENTAL ASSESSMENT

TMKs (4th): 4-6-04

Kawaihau District, County of Kaua‘i, State of Hawai‘i

Submitted Pursuant to Chapter 343, Hawai‘i Revised Statutes (HRS)
County of Kaua‘i, Department of Public Works

APPENDIX 1b Public Involvement Documentation

[This page intentionally left blank]

COMMUNITY MEETING # 1

DECEMBER 8 6:30 PM KAPAA MIDDLE SCHOOL
KAPAA BRIDGE

	<u>NAME</u>	<u>ASSOCIATION</u>	<u>CONTACT INFO (email)</u>
1.	CHARLES JURY	AKINAKA & ASSOCIATES	836-1900 cij@akinaka.com
2.	Mike Hunnemann	KAI Hawaii Inc	Mike@kaihawaii.com
3.	Allan A. Smith	AA Smith; Assoc	808-639-0808
4.	K. VENKATESAN	COK	808-241-4885
5.	Elsie/Tom Godbey	resident	821-0447
6.	Rayne Regush	W-KNA	TayneRegush@aol.com
7.	Glenn Mickens	None	glennmickens@hawaii.net
8.	Ray Carpenter	Resident	rrcorp@hawaii.net
9.	Marge Freeman	—	
10.	Jim Powell	SCS	651-5924
11.	Doug Haigh	resident	605 dhaigh@kawaii.net
12.	Larry Hill	COK	lhill@kawaii.net
13.	PAT GRIFFIN		patgriffin@hawaii.net
14.	Kent Teshima	CO/K	tel.net
15.	WA WOO KOO	COK	
16.			
17.			
18.			
19.			
20.			
21.			
22.			
23.			
24.			
25.			

MEETING ON KAPAHI BRIDGE REHABILITATION PROJECT DECEMBER 8, 2011

PRIOR TO START OF MEETING:

- Attendee requested Project Team (PT) explain to audience why community meetings are required.
- Attendee requested PM talk about historic significance of bridge.

START OF MEETING

- PT presented power point presentation
 - o Explained PT conducting community meeting for the following reasons:
 - As part of process required to receive federal funding.
 - To receive community concerns/suggestions related to project.
 - o Brief history of bridge
 - Year constructed - 1937
 - Year renovated – 1977 (*correct*)
 - Bridge materials – Steel girders and timber deck planking
 - o Pictures of structural deficiencies observed on bridge members.
- Community questions, comments and suggestions
 - o Attendee asked whether bridge girders are part of original construction
 - PT unsure whether girders renovated as part of 1977 work.
 - Attendee stated that if girders replaced as part of 1977 renovation, then bridge may not be considered historic.
 - PT added that according to residences located near the bridge, the original girders remained and deck was replaced.
 - Attendee stated that bridge decks are typically not considered historic since routine maintenance often repaves bridge decks.
 - o Attendee asked what the bridge's current load rating is and whether structural reports were conducted to determine load ratings.
 - PT stated current load rating is 5 tons
 - PT explained reports conducted in 2007 and 2009 as part of required bridge inspections every two years.
 - o Attendee asked whether bridge load rating decreased due to corrosion.
 - PT stated that load rating was 7.5 tons in 1990 and decreased to 5 tons in 1998.
 - o Attendee asked what type of construction would be needed to allow heavier loads to cross the bridge and whether new construction would include 2 lanes.
 - PT explained that these questions are part of PT's next step and current meeting is intended to gather community comments and/or suggestions.
 - o Attendee stated he has no opinion on whether bridge is one lane or two lane but improved bridge should be able to support emergency vehicles, school buses, etc.

- Attendee explained that bridge has history of being closed during floods and asked what is being considered to fix the problem, such as elevating the bridge or building bridge to withstand flooding.
 - PT explained that all reasonable options will be considered.
- Attendee asked who will make the final decision on bridge layout.
 - PT explained that federal, state, and county will all be involved.
- Attendee questioned how much weight community input will play since federal government would fund 80% of project.
 - PT explained that the community meeting process is a requirement set by the federal government to obtain funding and therefore federal government is very interested in community input.
- Attendees had detailed discussion explaining their understanding of the 106 process and the communities' voice in history and rural characteristics.
 - PT did not comment on discussion between attendees.
- Attendee questioned whether federal government would fund construction of a one lane bridge because previous project was not funded since design was for a one bridge.
 - PT explained that acceptance of one lane bridge will be discussed with the federal government.
 - Another attendee stated that federal government has made a lot of progress toward accepting one lane bridges since last project. Also, mentioned other one lane bridges on Kauai that have been federally funded.
- Attendee asked whether existing bridge is being considered for replacement or reconstruction and if so, he would like to see something other than “a hunk of concrete”.
 - PT stated that replacement will be considered as well as multiple bridge materials and designs.
- Attendee quoted statistics regarding one lane bridges having three times more accidents than two lane bridges. Also quoted statistic regarding amount of accidents on project bridge.
 - Another attendee questioned the statistics and requested PT provides statistics on amount of accidents recorded on project bridge.
 - Attendee emphasized that she would like a statistic of accidents actually on the bridge and not a statistic based on a length of road segment.
 - PT acknowledged request.
- Attendee stated that one lane bridges have been identified in county general plan to have important values to community and bridge should keep with rural scale and rural neighborhoods.
- Attendee questioned why Opeakaa, Puuopea and Kapahi bridges chosen and not other bridges in the area whose alignments, in his opinion, are more dangerous.
 - PT explained that the bridge selected for the project has been determined to be structural deficient, whereas other bridges mentioned by attendee have been determined to be functionally deficient. PT then explained that structurally deficient bridges have priority over functionally deficient.

- Attendee questioned why bridge has not been maintained since inspections are done every two years and therefore county would have been aware of its condition.
 - PT acknowledged concern but did not comment on county maintenance.
- Attendee asked whether bridge needs to be on historic registry to be considered historic.
 - PT explained that since the bridge is over 50 years old, its historic significance needs to be explored even if not registered.
- Attendee asked why the county does not just paint the bridge.
 - PT explained that the corrosion to the bridge is too extensive to be fixed by painting.
- Attendee asked if more than one option will be presented to the community.
 - PT explained that multiple options will be presented.
- Attendee asked if PT could inform community if bridge is eligible to be registered as historic at next meeting. Attendee also requested PT share more history of bridge with community at next meeting.
 - PT acknowledged request.
- Attendee asked whether PT will consult with State Historic Preservation Division (SHPD) and/or Kauai Historic Preservation Review Committee (KHPRC) before second community meeting.
 - PT stated that they plan to and are currently trying to get on their agenda.
- Attendee asked when Draft Environmental Assessment (EA) would be published.
 - PT explained current schedule predicts around 3 months however it is dependent on progress of community meetings.
- Attendee asked to clarify whether historical consultant on project team worked for an architecture firm or a structural firm.
 - PT explained that she worked for an architecture firm.
 - Attendee stated that previous project had a historical expert with a background in structural engineering and questioned whether current PT will have someone with these credentials.
 - PT explained that separate consultants are on PT for structural and historical considerations.
 - Another attendee stated that historical consultant on PT had previously worked for SHPD for over 10 years and feels she is very qualified. He also mentioned that SHPD typically uses architects.

END OF MEETING

OPAEEAA, KAPAHI, AND PUUOPAE BRIDGES
 COMMUNITY MEETING
 NOVEMBER 20, 2013
 KAPAA MIDDLE SCHOOL
 5:30 PM

SIGN-IN SHEET

	<u>NAME</u>	<u>ADDRESS</u>	<u>EMAIL</u>
1	Beverly Jay	6369 E Oloheua Rd Kapaa	BTWINGE@yahoo.com
	Ron Terry	10 Hina Hls 96720	rterry@hawaii.rr.com
	Tonia Moyl	1833 Kalaniana'olaha Ave., Hm 96815	tonia@funghawaii.com
	CHARLES JURY	3375 KOAPAA ST, HONOLULU, HI 96816	clj@akinaka.com
	Mike Deza	1347 Kapiolani Blvd #408 HNL HI	mike@scshawaii.com
	Jim Powell	" " " "	Jprk89@hawaii.net
	Allan A. Smith	Lihue, Kauai	Amby@hawaii.rr.com
2	Charles Milligan	6420 B Opaekaa Rd	Charles-a-milligan@yahoo.com
3	Peggy "	" "	Peggy.milligan@juno.com
4	Karen Rupp	6420-A Opaekaa Rd	rupp-nest@msn.com
5	Larry Dill	Lihue Kauai	ldill@kawaii.gov
6	Glenn MueBem	5920 Kii Pl Kapaa	glennwith2030@gmail.com
7	Mike Hunnemann	275 Kealahou Pt Honolulu	mike@kaihawaii.com
8	Joe Steinmetz	PO BOX 510231 Keala OBI	Isteinmetz@kamaal.gov
9	KEN TAYLOR		taylork021@hawaii.rr.com
10	Lynn Spears	PO Box 1977 Kapaa	
11	Randy Blake	PO BOX 1089 KAPAA	rcblake@mac.com

	Name	Address	email
12	Darin Moriki	—	dmoriki@thegardenisland.com
13	Andy Bushnell	6510 Oloheua Rd Kapaa	bushnell.andy@gmail.com
14	Stanford Iwamoto	5535 Kula Maui St.	Siwamoto@hawaiiintel.net
15	RISA Clemmons	6074 Lokomai kai pl. Kapaa	risarumpai@gmail.com
16	MARK Moksleah	2400 Hebeana Rd	demarsuano@kani.com
17	Doug Haigh	6431 Kahua Rd Kapaa	dhaigh@kawaii.gov
18	Kip Sharon Goodwin	6294 Q Oloheua Rd, Kapaa	kgoodwin@hawaiiintel.net
19	PAT GRIFFIN	Box 3213 Lihue	(Mike Dege has) (Tanya has too)
20	Lou Nishida	1070 Puuopae Rd, Kapaa	n/a
21	Rayne Regush	5875 Waipouli Rd KAPAA	rayneragush@aol.com
22	Tommy Noyes	6524 Kalama Road, Kapaa	thomasnoyes@hawaiiintel.net
23	MARY MULHALL	1210 CROSSLEY, KAPAA	MMULHALL@HAWAII-RR.COM
24	SHARRY GLASS	6372 PUUOPAE, KAPAA	
25	Kols ABREW	6562 KIPAAHI	
26	Nancy Budd	1337 Puuopae Rd Kapaa	njbudd@yahoo.com
27	Mollie & Henry Osborn	6482 Oloheua Rd Kapaa	
28	Mary Deple	6335 Waipouli Rd unit B	
29	Lelan Nishida	3-550 Kammali Highway Lihue	Lelan@Kawaii-Museum.com
30	Lou Nishida	1010 Puuopae Rd KAPAA HI 96746	
31			
32			
33			
34			

From: Glenn Mickens <glennruth2030@gmail.com>
Subject: **Kauai Bridges**
Date: November 19, 2013 6:23:57 PM HST
To: All Concerned Citizens

My primary concern in this one lane vs two lane bridge issue is keeping the welfare of the driving public paramount over any other reasons, specifically that of the Historical Commission.

I have made the case that there are at least 2 times more SERIOUS accidents on one lane bridges as there are on two lane bridges and I back this statement up with statistics from Alvin Takashita, Highway Division State Engineer, Glenn Okimoto, Director of Transportation and former Chief of Police CK Lum.

Let me read you a short quote from Mr Okimoto regarding the statistics given him from Alvin Takeshita: "This letter is to confirm that the accident data managed by the Department of Transportation is based on official State of Hawaii motor vehicle reports completed and approved by the Kauai Police Department."

Copies of Mr Takeshitas letter along with other supporting documentation have been given to Larry Dill, JoAnn Yukimura, and many other concerned parties.

There is no factual or legitimate reason for not keeping the safety of our drivers the number one priority when rebuilding our one lane bridges. Huge progress had been made in the field of medicine to extend and protect our lives and Doctors are not reverting back to arcane methods for "historical" reasons. Thus if facts show that we can save lives with newer, 2 lane bridges why go back to the more dangerous ones?

One lane bridges were built when there were fewer people on Kauai and fewer vehicles on the roads. But our highway engineers in their

wisdom now build our bridges two lane FOR SAFETY PURPOSES!!

This issue has been on going since 1996 and later 2002-03 and delaying building the newer bridges, as Mayor Baptist wanted to do, has cost the tax payers millions of dollars with nothing positive to show for the waste.

How can anyone using common sense with indisputable facts deny that safety over any other factor is a no brainer as ~~Mike~~ Marshall once said at a meeting?



AKINAKA & ASSOCIATES, LTD.

3375 Koapaka Street, Suite B-206

Honolulu, Hawaii 96819-1947

Phone: (808)836-1900 Fax No: (808)836-8852

MEETING NOTES

A&A JOB NO.: KAI10-03, KAI10-04 & KAI11-02

PROJECT: Rehabilitation/Replacement of the Opaekaa, Puuopae and Kapahi Bridges

DATE/TIME: November 20, 2013 – 5:30 pm

LOCATION: Kapaa Middle School Cafeteria

SUBJECT: Community Meeting #3

REFERENCES: Glenn Mickens Testimonial

DISCUSSION ITEMS:

1. Project Team Presentation
 - A. 5:35pm – Allan Smith
 - i. Called meeting to order
 - ii. Introduction of project and describe the meeting agenda
 - iii. Project background
 - a. Previous meetings
 - b. Project team to present findings
 - B. 5:36pm – Tonia Moy
 - i. Overview of Federal Process
 - a. Section 106 process
 - ii. Recapped community input from previous meetings
 - iii. Informed community that current meeting is intended to complete Section 106 process
 - iv. Presented findings of Traffic Study
 - a. Existing 1-lane bridges provide a service level of “A”
 - b. 1-lane bridge will still provide service level “A” based on projected developments
 - C. 5:42pm – Mike Hunnemann
 - i. Presented Opaekaa findings
 - a. Provided description
 - b. Presented 1-lane bridge design
 - c. Presented Area of Potential Effect (APE) & staging areas
 - d. Section 106 determination
 - (1) Anticipating a determination of “No Adverse Effect” with conditions.
 - (2) Presented conditions to obtain determination.
 - e. Opaekaa Q&A (see comments section below)
 - D. 6:03pm – Mike Hunnemann
 - i. Presented Puuopae findings
 - a. Presented 1-lane bridge design

- b. Presented Area of Potential Effect (APE) & staging areas
 - c. Section 106 determination
 - (1) Anticipating a determination of “No Adverse Effect” with conditions.
 - (2) Presented conditions to obtain determination.
 - d. Puuopae Q&A (see comments section below)
- E. 6:13pm – Mike Hunnemann
- i. Presented Kapahi findings
 - a. Presented 1-lane bridge design
 - b. Presented Area of Potential Effect (APE) & staging areas
 - c. Section 106 determination
 - (1) Anticipating a determination of “No Adverse Effect” with conditions.
 - (2) Presented conditions to obtain determination.
 - d. Kapahi Q&A (see comments section below)
 - ii. Presented anticipated design and construction schedules
- F. 6:23pm – General Question & Answer Session (see comments section below)
- G. 6:54pm – End of Meeting
2. Questions from Community
- (NOTE: “C” will indicate “Community Member” and “P” Project Team)
- A. C – Stated that the change in structural system from steel to concrete could be a significant effect on the bridge.
- i. P – Acknowledged, then stated that project team has already met with the SHPD and KHPRC and HHF and they indicated that they would concur with the “no adverse effect with conditions” determination.
 - ii. C – Asked if FHWA had submitted an official letter requesting determination.
 - iii. P – No, will be submitted after community meetings complete.
 - iv. C – Stated that Opaekaa Bridge has an interesting history and whether a plaque describing the bridge’s history could be placed at the bridge to mitigate the negative effect.
 - v. P – Acknowledged request.
- B. C – Asked about the thought process on the placement of the “bike sharrows” on the bridges.
- i. P – Placement of sharrows not finalized. Intended to alert drivers that bicyclists may also use the bridge.
 - ii. C – Questioned the use of two sharrows showing travel in opposing directions. Believes it indicates two way traffic on a 1-lane bridge and believes it is confusing. Suggested placing sharrow along centerline of bridge.
 - iii. P – Acknowledged concern and will take into consideration during the design process.
 - iv. C – Questioned use of sharrow because it indicates that drivers must share the road with bicyclist and the bridge is not wide enough for a vehicle and bicyclist side-by-side.
 - v. P – Stated that they believe the use of sharrow indicates that the bicyclist has the right to use the entire lane. Will verify during design process.
 - vi. C – Asked if there will be signs indicating bike use.
 - vii. P – Yes, signs can be installed to alert drivers.
 - viii. C – Reiterated other members comment on placing the sharrow on the centerline
- C. C – Will there be signs indicated a 1-lane bridge.
- i. P – Yes.
- D. C – Mentioned that at a previous meeting a vote was taken and a 2-lane bridge won the vote.

- i. P – The vote was not to decide the design
- ii. C – Expressed disapproval
- E. C - Why is Puuopae steel but Opaekaa concrete?
 - i. P – Puuopae is shorter so a steel design could be used to better match the existing look.
 - ii. C – Was the decision to use steel based on the historical aspects even though there are maintenance issues?
 - iii. P – Yes, steel was used based on the historic characteristics and design considerations.
- F. C – Will intersection of Puuopae and Kipapa Rd’s grade be fixed? There is an elevation change of 3 to 5-ft that makes it hard to see cars.
 - i. P – Acknowledged and will verify sight lines and distances during design.
- G. C – What is approximate timeline for construction?
 - i. P – 12-18 months
- H. C – Puuopae staging area on state lands that are lower than road with drainage problems, will the grade be fixed
 - i. P – Staging areas will be on road surface and not on the land in question.
 - ii. C - Acknowledged
- I. C – Are the side railings of Kapahi made of wood?
 - i. P – No, galvanized steel painted white.
- J. C – How often has Kapahi Bridge been washed out?
 - i. P – As recently as last year the railings were washed out.
 - ii. C - The wood railings are easily replaced when washed out, how quickly could the steel railings be replaced.
 - iii. P – Railings will be designed to withstand flood forces, so they will not need be replaced.
- K. C – What is the cost of the bridge?
 - i. P – 1.5 to 2.0 Million Dollars
- L. C – Testimony by Glenn Mickens (see attached written testimony)
- M. C – If bidding is in FY15, does that mean construction starts same year?
 - i. P – To date, Kapahi has funding for construction and other two do not. If bid in FY15, Kapahi construction should also begin that year.
- N. C – Responded to statement read by Glenn Mickens and stated that most of the community wanted a 1-lane bridge and referred to meetings from 2003. Also stated that the first community meeting, where most of the community wanted a two-lane bridge, had about 11 attendees and was held in the homesteads and she was not aware that the meeting was taking place.
- O. Larry Dill – Concurred that most of the community at homestead meeting wanted a 2-lane bridge and in other meetings most wanted 1-lane. Larry also reiterated the federal requirements and process required to obtain federal funding and reiterated traffic study that concluded the 1-lane bridge provides an adequate level of service. He also talked about Consultants being mandated to put in safety features and that the historic review process is required by law.
- P. C – Began with disclaimer explain that he works for Public Works but also lives in Kapahi. Talked about Counties plans for “Complete Streets” and that the County is looking at all the island roads and sharing them among bikes and vehicles. Stated he used to be in the 2-lane camp and gave a personal story about his family and emotional connection with 1-lane bridges. Stated that structural solutions look appropriate and asked if a wood-like material could be used on Kapahi so the wood planks would not need to be replaced as they wear.
- Q. C – Asked when the draft EA would be published.
 - i. P – Kapahi anticipated for Feb. 2014 and noted that would be a State EA, not Federal.
 - ii. C - Asked about CAT-EX

- iii. P - Federal representatives not in attendance, so Project Team not sure.
- R. C - Asked if traffic calming measures leading the bridges have been looked at. State that cars travel at high speeds leading to bridges.
 - i. P – Additional measures can be explored and discussed with the County.
- S. C – How wide is Puuopae?
 - i. P – 12'-6"
 - ii. C – Same as now? Should make it a little wider. Can emergency vehicles fit?
 - iii. P – Emergency vehicles can fit.
- T. C – Surprised Section 106 prevails over community and that safety is not being addressed. Why not make wider for people? Asked is elevation change between bridge and Kipapa Road will be addressed? If it remains 1-lane, fixing the elevation change will make it safer.
 - i. C – Stated that road on Kipapa side has a steep drop-off and guardrails should be installed. State the County is wasting money and should spend money more wisely.
- U. C – Pleased that the Section 106 process resulted in what community wanted and overwhelming amount wanted 1-lane bridge. Also stated that Kipapa Rd elevation should be addressed.
- V. C – State that 1-lane bridges are safe, drivers are not. In future cars will protect us from ourselves and history should be preserved.
- W. C – Will powerpoint be online?
 - i. P – Yes
 - ii. C – County website
 - iii. P – Yes
- X. C – Drainage a flood problems at Puuopae should be addressed.
- Y. C – Gave story about history of bridge and expressed appreciation for making the bridge safe for emergency vehicles and asked to recognize County for hard work.
- Z. C – School bus parking should be looked at for bus stop at Puuopae.
 - i. P – Can look at and discuss with County
- AA. C – Consultant should consider how children will cross Puuopae during construction because parents drop their kids off at the bridge.

3. 6:54 pm - End of Meeting.

KAPAHI BRIDGE REHABILITATION ENVIRONMENTAL ASSESSMENT

TMKs (4th): 4-6-04

Kawaihau District, County of Kaua‘i, State of Hawai‘i

Submitted Pursuant to Chapter 343, Hawai‘i Revised Statutes (HRS)
County of Kaua‘i, Department of Public Works

APPENDIX 2

Archaeological Inventory Survey and Section 106 Correspondence

[This page intentionally left blank]

**ARCHAEOLOGICAL INVENTORY SURVEY
FOR THE KAPAHI BRIDGE REPLACEMENT PROJECT,
BRIDGE NUMBER 007460021146001,
STATE SITE 50-30-08-2157
KAPAA HOMESTEADS 1 SERIES, KAPA`A AHUPUA`A,
KAWAIHAU DISTRICT, KAUA`I ISLAND, HAWAII
[TMK: (4) 4-6-004]**

Prepared by:
Cathleen A. Dagher, B.A.
and
Michael F. Dega, Ph.D.
March 2014
DRAFT

Prepared for:
KAI Hawaii, Inc.
31 South Pauahi Street #2
Honolulu, HI 96817

ABSTRACT

At the request of KAI Hawaii, Inc., Scientific Consultant Services, Inc. (SCS), conducted Archaeological Inventory Survey on approximately 2.9-acres of land on and around the Kapahi Stream Bridge complex in Kapaa Homesteads 1st Series, Kapa`a Ahupua`a, Kawaihau District, Kaua`i Island, Hawai`i [TMK: (4) 4-6-004]. The study was conducted as a portion of a multidisciplinary study pertaining to the placement of the Kapahi Bridge. Archaeological Inventory Survey consisted of historical background and archival research, full pedestrian survey of the project area of potential effect; documentation, site descriptions, and reporting of all relevant data.

During the Archaeological Inventory Survey, only one site (State Site 50-30-08-2157), Kapahi Bridge was identified. The one-lane bridge carries Kawaihau Road over Moalepe Stream. While it may have been built at an earlier date, the Kapahi Bridge is believed to have been constructed in 1937. Kapahi Bridge exhibits a single 36-foot span, with a total length of 38 feet, and the height of the soffit of the bridge above the stream-bed measures approximately 9 feet. Kapahi Bridge has undergone several design modifications over the years. According to Wilson Okamoto & Associates (in Spencer Mason Architects 1989), the current bridge “replaced a three-span, timber stringer bridge.”

State Site 50-30-08-2157 has been evaluated according to criteria established for the Hawai`i State Register of Historic Places (HAR§13-275-6). The site has been found to be significant under State of Hawai`i historic preservation Criterion D, for information content. The present study constitutes a portion of the Section 106, of the National Historic Preservation Act of 1966 (NHPA), process. No further archaeological work is recommended for the bridge and the surrounding area of potential effect.

TABLE OF CONTENTS

ABSTRACT.....	ii
TABLE OF CONTENTS.....	iii
LIST OF FIGURES	iv
INTRODUCTION	1
ENVIRONMENTAL SETTING	9
LOCATION	9
LANDSCAPE MODIFICATIONS AND SOIL REGIMES	9
CLIMATE.....	10
PAST POLITICAL BOUNDARIES	10
TRADITIONAL AND HISTORIC SETTING.....	11
TRADITIONAL SETTLEMENT PATTERNS	11
TRADITIONAL SETTING.....	11
TRADITIONAL LAND TENURE.....	13
HISTORIC SETTING	13
THE MĀHELE	14
THE PLANTATION-ERA.....	15
PREVIOUS ARCHAEOLOGY.....	18
EXPECTED FINDINGS	19
METHODOLOGY	19
RESULTS	20
CONSULTATION.....	21
SIGNIFICANCE ASSESSMENTS.....	22
RECOMMENDATIONS.....	23
REFERENCES	24

LIST OF FIGURES

Figure 1: USGS Quadrangle (Kapaa 1996) Map Showing Locations of Project Area and State Site 50-30-08-2157. 2

Figure 2: Tax Map Key [TMK: (4) 4-6-004] Showing Locations of Project Area and State Site 50-30-08-2157. 3

Figure 3: Kapahi Stream Bridge Area of Potential Effect

Figure 4: Photograph of Kapahi Bridge (State Site 50-30-08-2157), East side of Kapahi Bridge with County of Kauai Department of Water Pipes. View to the North. (Note: Jeep is parked at approximate location of the new bridge). 5

Figure 5: Photograph of Kapahi Bridge (State Site 50-30-08-2157). View to North. 6

Figure 6: Photograph of Kapahi Bridge (State Site 50-30-08-2157). View to West. 7

Figure 7: Photograph of Kapahi Bridge (State Site 50-30-08-2157). View to South. 8

INTRODUCTION

At the request of KAI Hawaii, Inc., Scientific Consultant Services (SCS), Inc., conducted Archaeological Inventory Survey (AIS) on approximately 2.9-acres of land on and around the Kapahi Bridge complex in Kapaa Homesteads 1st Series, Kapa`a Ahupua`a, Kawaihau District, Kaua`i Island, Hawai`i [TMK: (4) 4-6-004] (Figures 1 and 2). The work was conducted in preparation for the Kapahi Bridge Replacement Project. The Area of Potential Effect (APE) for the project is illustrated in Figure 3. Archaeological Inventory Survey consisted of historical background and archival research, full pedestrian survey of the project area, documentation, and reporting. This work fulfills a portion of the Section 106, of the National Historic Preservation Act of 1966 (NHPA), process.

During the Archaeological Inventory Survey, only one site (State Site 50-30-08-2157), the Kapahi Bridge structure itself, was identified (Figures 4 through 7). No other archaeological features or historic structures were identified in the stream bed, along the immediate banks of the stream, or elsewhere in the APE. Although the one-lane Kapahi Bridge may have been constructed earlier, it is believed to have been built in 1937 (Tonia Moy, Fung and Associates, personal communication). Kapahi Bridge remains in its original location (see Figures 5 and 6) but does not retain its historic integrity. The current Kapahi Bridge "... replaced a three-span, timber stringer Bridge" (Wilson Okamoto & Associates in Spencer Mason Architects 1989).

Fieldwork for this project was conducted on November 2, 2011 by SCS archaeologists James Powell, B.A. and Michael F. Dega, Ph.D., the latter whom also acted as the Principal Investigator for the current project. Archaeological Inventory Survey was conducted of the project APE in order to determine the presence/absence of archaeological features through systematic pedestrian survey. Subsurface testing was not conducted as the areas around the bridge were not readily amenable to testing as they occurred on/near residential properties, cleared pasture land, or County road ways. The ultimate goals of the project were to determine if significant archaeological sites occurred in the 2.9-acre project area and to provide significance assessments and recommendations to the State Historic Preservation Division (SHPD).

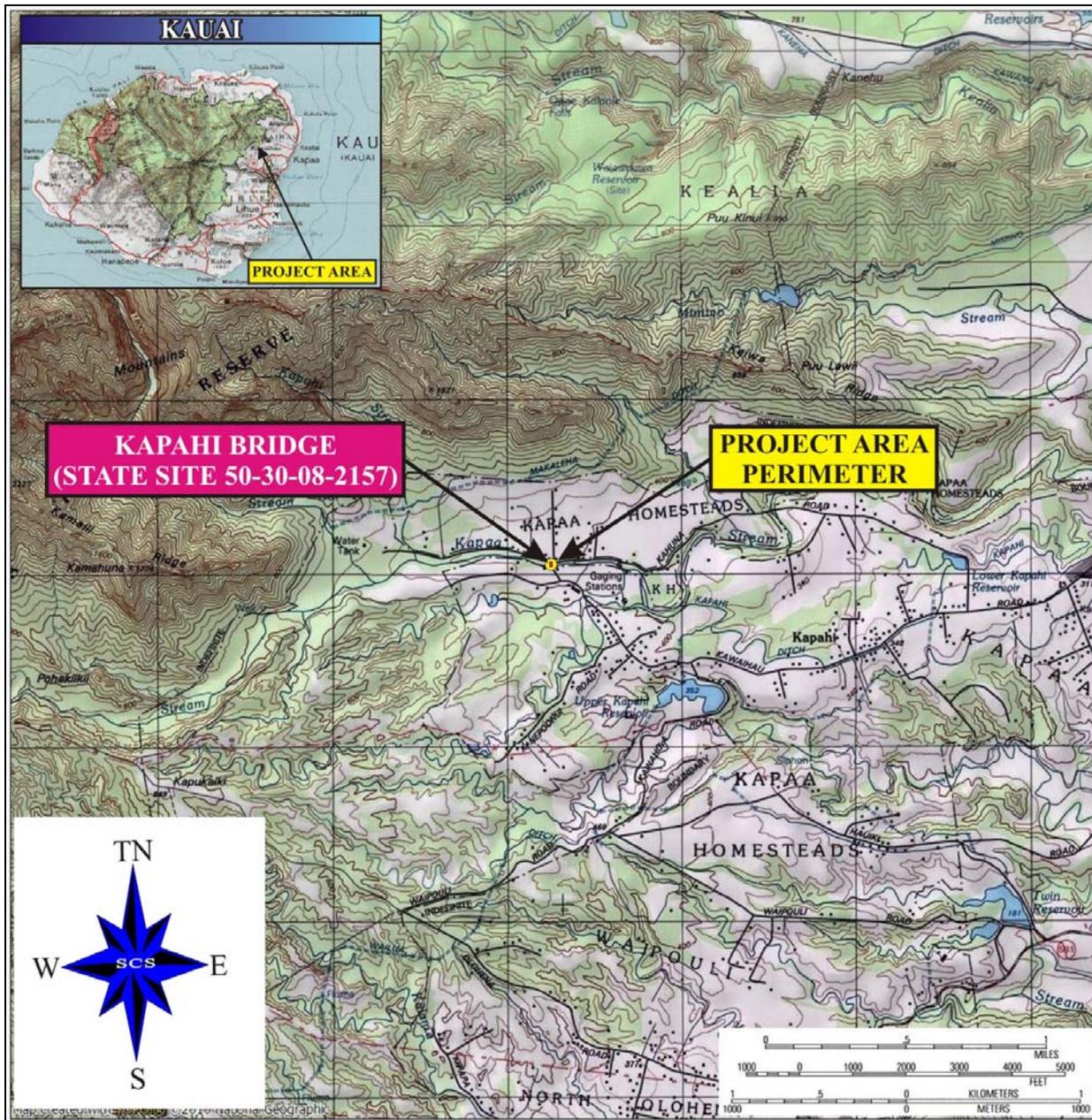


Figure 1: USGS Quadrangle (Kapaa 1996) Map Showing Locations of Project Area and State Site 50-30-08-2157.

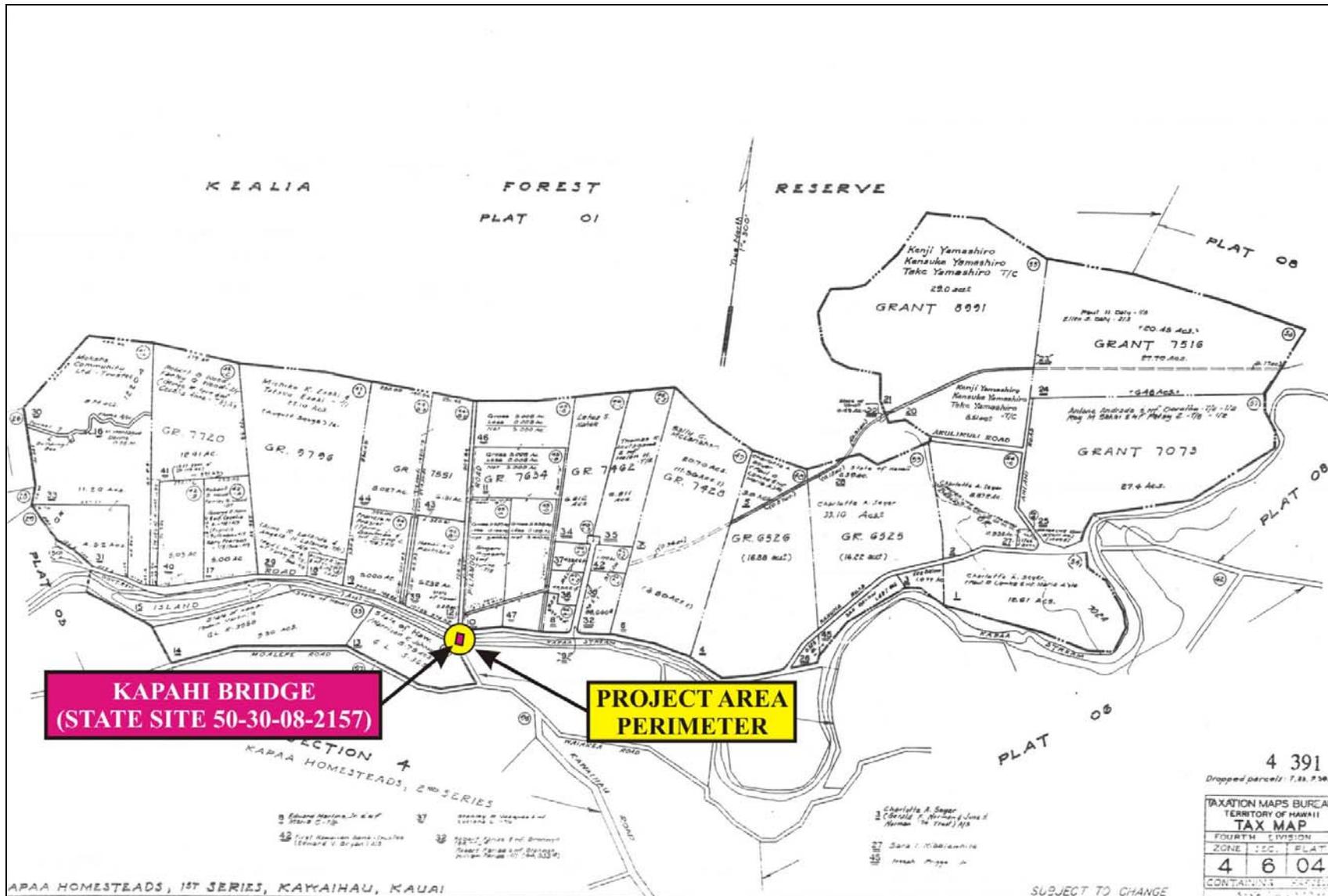


Figure 2: Tax Map Key [TMK: (4) 4-6-004] Showing Locations of Project Area and State Site 50-30-08-2157.

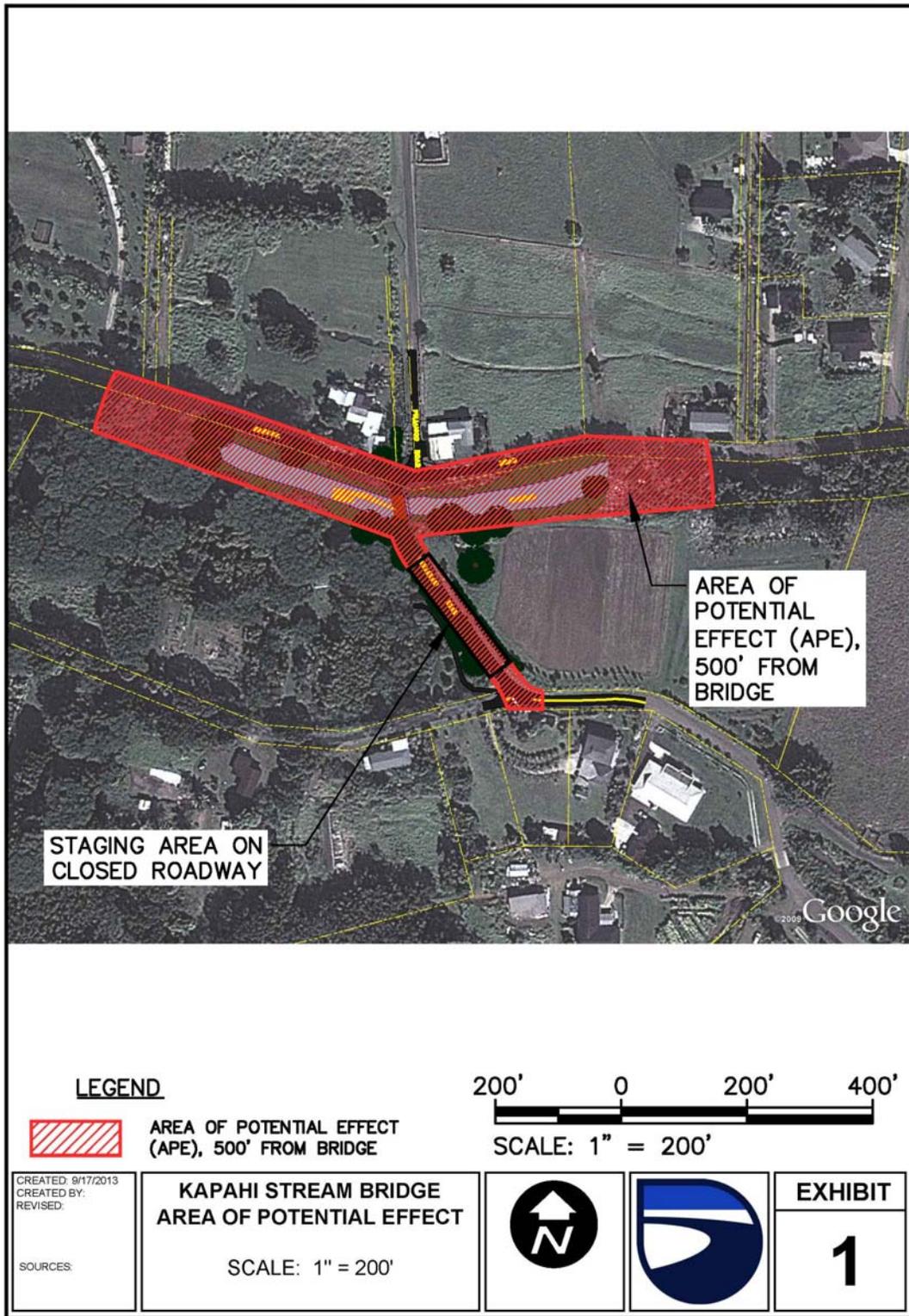


Figure 3: Kapahi Stream Bridge Area of Potential Effect



Figure 4: Photograph of Kapahi Bridge (State Site 50-30-08-2157), East side of Kapahi Bridge with County of Kauai Department of Water Pipes. View to the North. (Note: Jeep is parked at approximate location of the new bridge).



Figure 5: Photograph of Kapahi Bridge (State Site 50-30-08-2157). View to North.



Figure 6: Photograph of Kapahi Bridge (State Site 50-30-08-2157). View to West.



Figure 7: Photograph of Kapahi Bridge (State Site 50-30-08-2157). View to South.

ENVIRONMENTAL SETTING

LOCATION

Kaua`i, the oldest and fourth largest of the eight main Hawaiian Islands (with land area equaling approximately 1,432 square kilometers), was formed from one great shield volcano (Macdonald and Abbott 1970:458-461). At one time, this vast volcano supported the largest caldera in the islands, horizontally extending 15 to 20 kilometers across. Mount Wai`ale`ale, which forms the central hub of the island, extends 1,598 meters above mean sea level (amsl). Topographically, Kaua`i is a product of heavy erosion with broad, deep valleys, and large alluvial plains.

The project area lies within Kapa`a Ahupua`a, in Kawaihau District on the eastern flank of the island of Kaua`i, at c. 400 feet amsl. The area surveyed measured c. 2.9-acres. Kapa`a is one of ten *ahupua`a* located in the area known as Puna Moku during traditional times (Handy and Handy 1972:423). The project area and environs occur in the Kapaa Homesteads, which were opened in 1913.

The Kapahi Bridge carries Kawaihau Road over Moalepe Stream, a general west to east trending stream. According to Handy and Handy (1972:423), the Kapa`a Stream is formed by the confluence of Kapahi, Makaleha, and Moalep(i) Streams.

Neighboring roads include Kahuna Road to the north and Moalepe Road to the south. The northern and southern flanks of the bridge are adjacent to existing residences with lawns. The eastern and western flanks run along Kahuna Road and on both banks of the stream. The area surveyed for this study included lands around all cardinal points of the bridge and encompassing the entire APE.

LANDSCAPE MODIFICATIONS AND SOIL REGIMES

The current project area, inclusive of the bridge itself, Moalepe Stream, and adjacent lands bordering the stream and bridge access points, has undergone numerous modifications in the past. Existing residences flank both the northern and southern sides of the general bridge area. Non-native vegetation was prevalent, particularly along the stream banks and off the southwestern flank of the bridge bordering the road. The banks of the stream have been modified by Historic Period bridge construction and Modern road construction.

Typical soils encountered in the general project area are associated with the Kapaa Series, specifically Kapaa silty clay (KkB) (Foote *et al.* 1972: Sheet Map 29). The Kapaa Series consists primarily of alluvial-washed silty clays. These are well-drained soil on Kaua`i uplands and occur

on gentle to extreme slopes. Elevations for this series range from 200 feet to 500 feet amsl. Annual rainfall amounts associated with this series are estimated at 80 to 120 inches. The KkB soils occur on broad ridges and are of igneous origin. The KkB soils exhibit moderate permeability, slow runoff, and a slight erosion hazard. These soils are also associated with various forms of historic cultivation (sugarcane, pineapple, orchards, truck farming) as well as for ranchlands and water supply (Foote *et al.* 1972:61-62).

CLIMATE

The project area is relatively wet, with mean annual rainfall ranging from 40 to 120 inches annually (Armstrong 1983; Giambelluca *et al.* 1986). During the pre-Contact Period, a great amount of fresh water would have been locally available in the numerous streams that drain Mt. Wai`ale`ale. Annual air temperatures in the area vary from approximately 50 to 83 degrees (Armstrong 1983).

PAST POLITICAL BOUNDARIES

Approximately 600 years ago, the Hawaiian population had expanded throughout the Hawaiian Islands to a point where large, political districts could be formed (Lyons 1903; Kamakau 1991; Moffat and Fitzpatrick 1995). At that time, Kaua`i consisted of six districts, or *moku*: East and West Kona, Puna, Ko`olau, Halele`a, and Nāpili. Land was considered to be the property of the king or *ali`i `ai moku* (the leader who controls the island/district), which he held in trust for the gods. The title of *ali`i `ai moku* ensured rights and responsibilities to the land, but did not confer absolute ownership. The king kept the parcels he wanted; his higher chiefs received large parcels from him, and in turn, distributed smaller parcels to lesser chiefs. The *maka`āinana* (commoners) worked the individual plots of land.

In general, several terms, such as *moku*, *ahupua`a*, *`ili* or *`ili`āina* were used to delineate various land sections. A district (*moku*) contained smaller land divisions (*ahupua`a*) that customarily continued inland from the ocean and upland into the mountains. Extended household groups living within the *ahupua`a* were, therefore, able to harvest from both the land and the sea. Ideally, this situation allowed each *ahupua`a* to be self-sufficient by supplying the needed resources from different environmental zones (Lyons 1875:111). The *`ili* or *`ili`āina* were smaller land divisions next in importance to the *ahupua`a* and were administered by the chief who controlled the *ahupua`a* in which it was located (Lyons 1875:33; Lucas 1995:40). The *mo`o`āina* were narrow strips of land within an *`ili*. The land holding of a tenant or *hoa`āina* residing in an *ahupua`a* was called a *kuleana* (Lucas 1995:61).

TRADITIONAL AND HISTORIC SETTING

Archaeological settlement pattern data indicates that initial colonization and occupation of the Hawaiian Islands first occurred on the windward shoreline areas around c. A.D. 900, with populations eventually settling into drier leeward areas at later periods (Kirch 1985). Coastal settlement was still dominant, but populations began exploiting and living in the upland *kula* (plains) zones. Greater population expansion to inland areas did not occur until around the A.D. 12th century and continued through the 16th century. Large scale or intensive agricultural endeavors were implemented in association with habitation. Coastal lands were used for settlement and taro was cultivated in near-coastal reaches and in the uplands.

TRADITIONAL SETTLEMENT PATTERNS

The Hawaiian economy was based on agricultural production and marine exploitation, as well as raising livestock and collecting wild plants and birds. Extended household groups settled in various *ahupua`a*. During pre-Contact times, there were primarily two types of agriculture, wetland and dry land, both of which were dependent upon geography and physiography. River valleys, such as those on Kaua`i, provided ideal conditions for wetland *kalo* (*Colocasia esculenta*)—agriculture that incorporated pond fields and irrigation canals (*`auwai*). Other cultigens, such as *kō* (sugarcane, *Saccharum officinarum*), *mai`a* (banana, *Musa sp.*), and *`uala* (sweet potato, *Ipomoea batatas*) were also grown. This was the typical agricultural pattern seen during traditional times on all the Hawaiian Islands (Kirch and Sahlins 1992, Vol. 1:5, 119; Kirch 1985). Agricultural development on Kaua`i was likely to have begun early (A.D. 1100–1300), during what is known as the Expansion Period (Kirch 1985). Coastal zones were utilized for marine resources, habitation, burials, and ceremonial structures often associated with fishing (Bennett 1931). Often, land sections located in back of the shoreline contained pond fields and dunes that were used for sweet potato production (Handy and Handy 1972; Earle 1978). Trails linked the *makai* and *mauka* sections of the *ahupua`a*, allowing easy access to its resources. Other trails skirted the coast, which made communication between *ahupua`a* possible.

TRADITIONAL SETTING

Kaua`i is the fourth largest and the oldest of the main Hawaiian Islands. It is said that many years ago, the fire goddess Pele and her family briefly stopped on Kaua`i to explore the possibility of finding a permanent home. She dug a deep pit, but it was instantly filled with water, so they left Kaua`i and traveled on, and eventually settled in Halema`uma`u, on the island of Hawai`i, where she resides to this day (Beckwith 1976).

Despite Kaua`i Island's separation from the rest of the Hawaiian archipelago (the channel that separates Kaua`i and Ni`ihau from O`ahu is 63 miles wide), the rich variety of topography and climate has been extremely influential in establishing broad settlement patterns (Bennett 1931:4). The varied ecological division of the island, which contains verdant cliffs, dry and sandy flats, wide river valleys and tracts of fertile soil, provided the opportunities for a wide variety of cultivation.

Handy and Handy (1972:423) note that the inland portion of Puna District (Kawaihau) contains a number of small streams along which small *lo`i* were developed. The *ahupua`a* of Kapa`a has been described as a broad, wide, and deep kula land containing small ridges and valleys inland and two small streams (Handy and Handy 1972:23). Handy and Handy (1972:423) go on to say that "...there was a highly developed irrigation system at Kapa`a..." with "...extensive flatlands located below the mountains with terraces irrigated from Kapahi, Makaleha, and Moalepi Streams" Bennett (1931:128) states that in the homestead area, many little valleys contain taro terraces. Further, below the mountains, there were extensive flatlands where agricultural terraces irrigated by such streams as Kapahi were located (Bennett 1931:128). The terraces were described as "Single rows of stone mark the divisions with some 2-foot terraces" and designated as Bennett's Site 110 (State Site 50-30-08-110) (Bennett 1931:128). This is also the location of the upper homesteads (Kapaa Homesteads). Bennett's Site 111 (State Site 50-30-08-111), as described by Bennett (1931:128-129) and also occurring in the area (inland and south of Kealia Valley), consisted of a "simple dirt ditch, about 6 feet in width and of varying depths which is traditionally referred to as a Hawaiian ditch."

During the pre-Contact period (prior to 1778), this upper region was marginally settled but contained excellent land for agriculture, it being a product of alluvial deposition from all the streams in the area. Impressive irrigation systems were built on Kaua`i to transport stream water to agricultural fields during traditional times (Handy and Handy 1972; Earle 1978). In 1892, Dole (1916) reported that these ancient agricultural resources of eastern Kaua`i were still functioning, as evident by the extensive ditch irrigation system throughout Wahiawa, Kapa`a, and Kilauea.

Handy and Handy (1972: 424) state that Kapa`a "is famous as the home of the great *ali`i* Mo`ikeha who lived there in his later years." It was also the home of the boy Pāka`a, who lived there with his mother and uncle. Pāka`a longed to go with the fishermen who caught his favorite food (*mālolo*, flying fish), but they always refused his pleas. So, Pāka`a invented the crab-clawed sail and challenged the fishermen to a race, betting that whoever reached the shore first could

keep the day's catch. Pāka`a won the race and that night he and his family had all the *mālolo* they could eat (Wichman 1998:85).

TRADITIONAL LAND TENURE

According to Kamakau (1964), traditional Hawaiian land tenure was a system formed in order to care for the land. Around the 14th century, various individual island *mo`i* (ultimate ruler) believed the land should be surveyed as to be permanently marked. The land system was needed to avoid disputes between neighboring *ali`i* (chiefs). A *kahuna* (priest/expert) named Kālaika`ōhia is said to have carved the land into districts (*moku*) and numerous smaller divisions (i.e., *ahupua`a*, *`okana*, *`ili* etc.) were also coordinated.

The idea of holding land was not synonymous with owning it, but more like a trusteeship between the caretakers and the nature gods Lono and Kane (Handy and Handy 1972:41). The *ahupua`a* is the most well known of all traditional land divisions and is still relevant today.

The *ahupua`a* land divisions vary in size and generally encompass land from the mountain to the sea. Traditionally, the areas were governed by a designated caretaker (*konohiki*) and those residing within the region had designated access to all mountain and marine resources. Chinen (1958:5) explains that all chiefs and commoners were entitled to a portion of the mountain and marine resources.

HISTORIC SETTING

The first recorded Western contact in the Hawaiian Islands was made in 1778 on the southern coast of Kaua`i (Beaglehole 1967). Waimea was the port of call for many years, leaving the rest of Kaua`i an uncharted territory. Portlock and Dixon visited Waimea in 1786 and in 1787 and John Meares also stopped on his way to Canton, China, in 1787 (Joesting 1987:44). Captain William Douglas sent two sailors ashore in Waimea to collect sandalwood in 1789, and in 1791, Captain John Kendrick left three men on Ni`ihau to look for pearls and sandalwood. There is no description of the eastern coast until Captain George Vancouver traveled up the coast from Wailua in 1793. As there was no anchorage, he sailed towards Kapa`a, noting that this was: "...the most fertile and pleasant district of the island..." (Joesting 1987:50).

Much of the knowledge of traditional land use patterns is based on what was recorded at the time of, and shortly after, Western contact. Early records, such as journals kept by travelers and missionaries or Hawaiian traditions that survived long enough to be written down, assist in understanding the past. Protestant missionaries arrived in Hawai`i in April of 1820 and by the end of the year, were settled on Kaua`i. In 1830, as part of the missionary report, a census of

individuals living in the *ahupua`a* around the islands was recorded (Schmitt 1973). We are limited to traveler's journals for information concerning descriptions of the general Wailua region.

In 1849, William Patterson Alexander landed at Koloa, Kaua`i where he was to embark over land to the mission houses in Wai`oli:

May 5. This morning we rose early....A few miles from Wailua, near Kapaa we passed the wreck of a schooner on the beach, which once belonged to Capt. Bernard. It was driven in a gale over the reef, and up on the beach, where it now lies. A few miles further we arrived at Kealia. We had some difficulty in crossing the river at this place, owing to the restiveness of our horses. The country here near the shore was rather uninviting, except the valleys which always contained streams of water....The two peaks of Anahola are quite a landmark to one traveling in this region....[Alexander cited in Kaua`i Historical Society 1991:123].

On his return to Koloa, Alexander traveled back through Keālia:

...Five miles from Anahola we stopped at Kealia, a picturesque valley containing a beautiful waterfall, to bathe & rest our horses. In leaving the valley, I unfortunately left my spur, & did not think of it till we had ridden nearly a mile. I rode back for it and found it, determined to lose nothing on Kauai by carelessness [Alexander cited in Kaua`i Historical Society 1991:129].

Although no people are mentioned, it can be assumed they were there, perhaps more inland, tending to lands worked by their families for generations.

THE MĀHELE

In the 1840s, traditional land tenure shifted drastically with the introduction of private land ownership based on Western law. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kamehameha III was forced to establish laws changing the traditional Hawaiian economy to that of a market economy (Kuykendall 1938 Vol. I:145; Daws 1968:111; Kelly 1983:45, 1998:4; Kame`eleihiwa 1992:169-70, 176). The Māhele of 1848 divided Hawaiian lands between the king, the chiefs, the government, and began the process of private ownership of lands. The subsequently awarded parcels were called Land Commission Awards (LCAs). Once lands were made available and private ownership was instituted, the *maka`āinana* (commoners) were able to claim the plots on which they had been cultivating and living, if they had been made aware of the procedures.

These claims did not include any previously cultivated but presently fallow land, *`okipū* (on O`ahu), stream fisheries, or many other resources necessary for traditional survival (Kelly 1983; Kame`eleihiwa 1992:295; Kirch and Sahlins 1992). If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA and issued a Royal Patent after which they could take possession of the property (Chinen 1961:16).

The current bridge location does not itself fall into any LCA's or land grants. However, there are adjacent lands which are demarcated as land grants and land court applications. A majority of these inland claims were associated with streams, where wetland *kalo* (taro) was produced and house sites were scattered about the agricultural area.

THE PLANTATION-ERA

As stated above, commercial sugarcane agriculture came to Keālia during the middle to late 19th century. According to Dorrance and Morgan (2000), the Kealia Sugar Plantation was in operation from 1869 until 1885. The Makee Sugar Company ran from 1877 until 1933.

George H. Fairfield, general manager of the Makee Sugar Company, employed the “divide and rule strategy” by hiring a labor force consisting of multinationals which provided for stable work force with little division (Takaki 1983:24). Plantation life for the workers could be very harsh; when it came to production, workers were treated little better than slaves (*ibid*: 74).

Around this time (1865), William T. Brigham, future curator of the Bishop Museum, toured Kaua`i on horseback, passing through the inland area on his way to Keālia:

...After riding through several kukui groves, and over pleasant ridges we came to Kealia, the residence of Mr. Krull. Here I lunched at two o'clock. Many kukui trees were covered with dodder. A few miles beyond we passed a Golgotha, and as we turned towards the shore again, saw a curious hole in the ridge [Anahola Mts] which comes to an abrupt end here. [Brigham in Kaua`i Historical Society 1991:142].

A landing had been built in Kapa`a during the plantation's early years, making Keālia one of the four ports or landings with scheduled steamer calls. The Valley House mansion was built by Colonel Z. S. Spalding in 1880 near the boundary of Kapa`a and Keālia; with the continued success of the sugar crops, he subsequently dismantled and moved the Kapa`a Mill to Keālia in 1885. Condè and Best (1973) suggest that railroad construction for the Makee Plantation started just prior to the 1890s. Eventually, the railroad line was part of a twenty-mile network which included portable track along a portion of Keālia Valley and the *mauka* regions

on the plateau lands north of Keālia. In 1910, their rolling stock consisted of 400 can cars and three locomotives (Condè and Best 1973). The old Government road, or Mauka Road, crossed Keālia River above a rice plantation and passed over the hill near Colonel Spalding's home. At the beginning of the 20th Century, a new road was built which after crossing the river at the *makai* end of Keālia Stream, paralleled the ocean and the railroad track, and then turned *mauka* passing through Keālia Town to meet up with the old Government Road (Bushnell *et al.* 2002). Around 1912, the Keālia Bridge, which traversed Keālia Stream, was built of steel.

Having already been successful with sugarcane on Maui, Captain James Makee started his third sugar venture with King Kalākaua on Kaua`i. James Makee had been in the islands since 1843, when an unfortunate incident involving a deranged cook on the whaler *Maine* en route from Lāhainā to Honolulu, attacked him with a cleaver. As a result, he was forced to spend a period of recuperation in Honolulu (Dorrance and Morgan 2000:31). In spite of this rather violent introduction, Captain Makee was quite taken with Hawai`i and while recovering sent for his family on the east coast with the intention of settling in the islands. After developing a successful trading business in Honolulu, Captain Makee purchased the defunct Torbert plantation and mill in `Ulupalakua on Maui. In 1876 he broadened his sugar domain by purchasing a partnership in Waihe`e Sugar Company and by 1878, had become its sole owner. In 1876, Krull sold his ranch to Colonel Spalding and Makee.

The Keālia Plantation began as a partnership between Makee and King Kalākaua with the purchase of Krull's Kapa`a dairy in 1877. Not only Kalākaua joined Makee in this east Kaua`i sugar venture, but the Hui Kawaihau, which was made up of prominent associates of the king, became a part of the enterprise (Bushnell *et al.* 2002). Makee was given land in Kapa`a for a mill and he agreed to grind cane supplied by the Hui members. Kalākaua also established a new district in Kaua`i (Kawaihau) that included all of the land between Wailua and Moloa`a, where the Hui could cultivate their crops. Sugar was milled for four years, but after a fire destroyed half of their crop and the sudden death of Captain Makee, the Hui began to dissolve and the leasehold rights passed on to Makee's son-in-law and the new plantation owner, Colonel Spalding (Dole 1916). In 1885, the company relocated to Spalding's plantation in Keālia, where it generated a thriving community. This community included a post office, reservoirs, a landing, a theater, and railway connections to nearby Anahola and to Līhu`e, and seven plantation camps. The plantation camps were established mostly in the Kumukumu `ili. The camps were given meaningful names which distinguished immigrant groups or site locations. Yaki Camp was for Japanese immigrants, Chong for the Chinese. New Stable Camp, Old Stable Camp, Mimino

Camp, Amberry Camp, and Halaula Camp were other camps which were on the Makee Plantation.

In July of 1895, Eric Knudsen spent sometime traveling around the island of Kauai noting:

On we went; no time to stop. The Kealia Sugar Co's cane fields came into view. The sleeping giant was on our left-the sand dunes on our right. The next village was Kapaa-only a small place-and riding around a bluff called Kaiakea we came in view of the Kealia Mill. Here was the domain of Col. Z.S. Spalding. I had met him many years before when I was a little boy and he had come to buy sheep from my father [Brigham in Kauai Historical Society 1991:152].

Along with the growth of sugar plantations, there was an influx of immigrants initially from China, Japan, and Portugal. By the late 1800s, the Makee Plantation alone was employing more than one thousand workers (Cook 1999). John Rapoza arrived in 1883 on the S.S. James Makee from Portugal:

...I was then twenty-one years of age and with my parents. The trip from Honolulu to Kapaa was made in the usual time of 15 hours, but it was for worse than the 60-day trip we made from Europe. I was under a three-year contract to work on the plantation. We Received \$9 a month for our work and \$8 a month for "kaukau". Originally, the sugar from Kealia was sent to Kapaa in wagons drawn by California horses. The railroad track was made from Kealia Mill to Kapaa Landing about 1886. I drove the horses or mules on these cars. Two small locomotives were bought about 1890. The steamer James Makee could take 2500 bags of sugar. The Kaala took 2000 bags [*The Garden Island*, August 18, 1978]

As was the policy, a school, stores, and other necessities were provided by the plantation and a town quickly materialized on the plain around the mill. The first school, Kapa`a English School, was built in 1883 on Ka`ahi`ahi point adjacent to the Makee Company railroad and a church appeared in 1887. In 1908 the church was moved to its present location on Kawaihau Road.

In the early 1940s, pineapple was grown in fields, in Keālia, at an elevation of 360 feet above mean sea level and sugarcane continued to be cultivated below the belt road. However,

with the arrival of World War II and the military take over of the Spalding estate, things changed:

Various structures were built including four barracks, a large warehouse, a garage and a bomb shelter and an ammunition tunnel in the side of a hillside [Parks 1985:8].

East Kauai Water Company (EKW) was established in 1924 with jurisdiction over the waters that arise in and cross through state lands. EKW waters are all the flows of the North Fork of the Wailua River, the Kapa`a and Anahola Rivers and their tributaries, and such waters of Hanalei River and Kaapoiko stream that are diverted into the North Wailua drainage basin. The EKW ditch system runs for 34 miles of which 101 tunnels comprise 11 miles (Wilcox 1996:69).

By the mid-Twentieth Century, many of the homesteaders in the area, who had grown sugarcane and pineapple for the larger companies, were occupied in fields other than agriculture, and the homesteads became more residential in nature.

PREVIOUS ARCHAEOLOGY

Archival research indicated the current project area has not undergone previous archaeological work. However, other projects were conducted in the general vicinity.

In 1991 Cultural Surveys Hawaii (CSH) performed an Archaeological Inventory Survey in Waipouli Ahupua`a, Kawaihau District, Kaua`i [TMK: (4) 4-3-008:001] (Folk *et al.* 1991). State Site 50-30-08-1836, Waipouli Cultural Layer, an extensive cultural layer containing numerous post molds and pit features covering the southern portion of TMK: (4) 4-3-008:001, was identified during this study. State Site 50-30-08-1836 also included eight human burials with three burials being stratigraphically contemporaneous with the cultural deposit. Historic artifacts were present in the upper portion of the cultural layer and artifacts encountered in the lower portions were believed to be associated with the pre-Contact Period. This is supported by the results four radiocarbon samples collected from the *makai* (east) lot which yielded radiocarbon dates ranging from A.D. 1500 to 1950 and the traditional artifact assemblage (Folk *et al.* 1991 in Hammatt 1991). State Site 50-30-08-1836 was interpreted this site as a permanent pre-Contact occupation area. State Site 50-80-03-1848, Kapa`a Cultural Layer, was identified on the *makai* (east) side of Kuhio Highway and interpreted as a Traditional-type permanent habitation site associated with the shoreline occupation of Kapa`a Ahupua`a. State Site 50-80-03-1849 was

located on the southern portion of Inia Street and thought to extend the entire length of the street, to the shoreline, and possibly to Kuhio Highway. This site also was interpreted as permanent habitation associated with the shoreline occupation of Kapa`a Ahupua`a (Folk and Hammatt 1991).

In 2000, Pacific Legacy, Inc. conducted archaeological inventory survey of a 398 parcel located in Kapa`a Ahupua`a in TMK: (4) 4-3-003:005 (McIntosh and Cleghorn 2000). During this survey eleven surface features were newly identified and designated State Site 50-30-08-989. State Site 50-30-08-989 has been interpreted as being associated with the Historic Plantation Era.

In 2000, Scientific Consultant Services (SCS) conducted Archaeological Monitoring for the Kapa`a Beach Park Public Bathroom Installation (Calis 2000). During the Monitoring activities human skeletal remains, representing a single individual, were identified at a maximum depth of 0.30 meters below surface. These remains were determined to have a secondary context, given the disturbed nature of the associated deposit.

In 2003, SCS conducted archaeological monitoring on a parcel approximately 100 m to the north of the current project area (Dega and Powell 2003). During the Monitoring activities that took place, three human burials and four additional subsurface features associated with a traditional cultural layer were designated Site 50-30-08-881. Charcoal collected from the buried A Horizon yielded a calibrated two sigma radiocarbon date range of A.D. 1480-1660.

EXPECTED FINDINGS

Given the background and archival research completed prior to fieldwork, expectations for identifying any historic properties, other than the bridge itself, were considered minimal. The environment around the bridge footprint has mostly been developed (roads, bridge work, residences) and utilized for agriculture and pasture. Thus, the landscape has been significantly altered. There was only a remote chance that possible *lo`i* terraces/walls or historic constructions would be identified, these having been previously noted for the area by Handy and Handy (1972) when referring to pre-Contact and early historic taro cultivation.

METHODOLOGY

Archaeological Inventory Survey primarily consisted of archival research, fieldwork, and reporting. Archival research for this project was conducted at the State Historic Preservation

Division (Oahu) and the Kaua'i Historic Society/Kaua'i Museum. Fieldwork was conducted on November 2, 2011 by SCS archaeologists J. Powell, B.A. and M. Dega, Ph.D., who also acted as the Principal Investigator for the current project. Fieldwork consisted of pedestrian survey and limited photographic documentation. Survey was accomplished by both crew members walking over and under the bridge, along the adjacent streambed, and along the stream banks on both sides of the bridge within and just beyond the APE.

Archaeological Inventory Survey was conducted of the current project area in order to determine the presence/absence of archaeological features on the ground surface through systematic survey of the project area footprint. The ultimate goal of the project is to determine if significant archaeological sites were present in the footprint and to provide significance assessments and recommendations to the State Historic Preservation Division (SHPD). As discussed above, only the bridge qualified as an archaeological site. The bridge was photographed and conditionally compared to the nomination form. No other historic properties were identified in the project area.

RESULTS

During the current Archaeological Inventory Survey State Site 50-30-08-2157, the Kapahi Bridge, was identified and documented. Given the alluvial nature of the stream banks and adjacent flat environs, this area could have formerly been a good place to cultivate taro, as Handy and Handy (1972:423) had noted for the area. However, no evidence for cultivation was evident.

As stated elsewhere in this document, the Historic Period Kapahi Bridge (State Site 50-30-08-2157) was the only historic property identified in the project area (see Figures 4 through 7). The one-lane bridge remains in its original location carrying Kawaihau Road over Moalepe Stream. The Kapahi Bridge exhibits a single 36-foot span, with a total length of 38 feet, and the height of the soffit of the bridge above the stream-bed measures approximately 9 feet. The Kapahi Bridge has undergone several design modifications over the years. The following summary material is based on historic records and summaries previously researched by Spencer Mason Architects (1989).

Although construction may have occurred at an earlier date, the Kapahi Bridge is believed to have been constructed in 1937 (Tonia Moy, Fung and Associates, personal communication). According to Wilson Okamoto & Associates (in Spencer Mason Architects

1989), the current bridge “replaced a three-span, timber stringer bridge.” Spencer Mason Architects (1989) state that:

No plans for [the Kapahi B]ridge were located in the County Department of Public Works, not even the plans for the 1997 repair(s)...[The Kapahi Bridge] may date from before 1937, if it is the same bridge that the County Engineer reported was being widened in October of that year. It was not built before 1907, as the map of Kapaa Homesteads in the State Survey Office was based on a worksheet from that year and does not show any bridge crossing Kapaa Stream in that location.

According to Spencer Mason Architects (1989) repairs were made to Kapahi Bridge in 1977. At that time some of the original building materials were replaced, with only the original abutments being retained. The original timber decking and piers, which were not removed, were replaced by steel girders. However, the southern pier, which had been subjected to flood damage, was removed. As the original wooden planks have become weathered and worn they have been replaced with steel planks.

Kapahi Bridge, and surrounding roads, provided an integral transportation link that led to the success of the homestead lands. Initially, homesteading was not thought as a highly viable venture by many in the government, most of the homestead lands being controlled (from c. 1913) by large businesses and the government. There was opposition to homesteads as some thought this simply a ploy for a land grab, which would remove the lands from the profitable sugarcane industry which the lands were farmed. By 1917, the Kapa`a homesteaders had soundly defeated that argument.

In all, Kapahi Bridge performed an elevated transportation and communication function for homesteaders during the Plantation Era. The bridge represents a strong relationship with early to mid-Twentieth Century land use in the Kapaa Homesteads area.

CONSULTATION

In compliance of Section 106 of the National Historic Preservation Act of 1966 (as amended) and the National Environmental Policy Act (NEPA), SCS, as part of the overall project bridge team (Kai Hawaii, Fung and Associates, *et al.*) has conducted multiple, formal consultation through community meetings as well as a formal Cultural Impact Assessment for this project (Dagher and Spear 2012). The latter undertaking included interviews with community individuals knowledgeable about the bridge and general project area. A report

documenting the consultation process and results was prepared and submitted under separate cover. The team has also discussed the bridge with the Kaua`i Historic Preservation Review Commission (KHPRC) on three occasions. The results of all these meetings have been included in a Section 106 letter, submitted to the SHPD.

SIGNIFICANCE ASSESSMENTS

During the current Archaeological Inventory Survey, State Site 50-30-08-2157, the Historic Period Kapahi Bridge, was re-located. The site has been evaluated for significance according to the established criteria for the Hawai`i State Register of Historic Places §13-275-6. The five criteria are classified as follows:

- Criterion a: Site [or structure] is associated with events that have made a significant contribution to the broad patterns of our history;
- Criterion b: Site [or structure] is associated with the lives of persons significant to our past;
- Criterion c: Site [or structure] is an excellent site type; embodies distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components may lack individual construction;
- Criterion d: Site [or structure] has yielded, or has the potential to yield, information important in prehistory or history;
- Criterion e: Site has cultural significance; probable religious structures or burials present.

State Site 50-30-08-2157 has been evaluated and found to be significant under Criterion D, for information content.

According to Spencer Mason (1989), the Kapahi Bridge has integrity in terms of original location (Moalepe Stream). Kapahi Bridge also has limited artistic value as exhibited in the geometrical white lines of the railing and the positioning of the sloping braces. However, the structural integrity of the Kapahi Bridge has been altered (Spencer Mason Architects 1989). While some of the original bridge components were retained, most of the components supporting the bridge have been replaced with steel. The steel stringer/multi-beam structural type is not unique, as there are other bridges on island which exhibiting the same structural type. As the date of construction has not been firmly established the Kapahi Bridge cannot be considered as a

good example of a bridge associated with a specific time period. The bridge measures 38 feet in length with the height of the soffit by the 9 feet above the stream bed. These dimensions are considered to be relatively small and indicate the engineering of the Kapahi Bridge is not considered to be complex and has low integrity from its original structure.

RECOMMENDATIONS

Based on the findings of the Archaeological Inventory Survey and the significance evaluations, the Archaeological Inventory Survey has been completed and no further archaeological work is recommended for the current bridge replacement undertaking.

REFERENCES

- Armstrong, R. Warwick
1983 *Atlas of Hawaii*. University of Hawaii Press, Honolulu.
- Beaglehole, J.C.
1967 *The Voyage of the Resolution and Discovery 1776–1780*. Hakluyt Society University Press, Cambridge.
- Beckwith, Martha
1976 *Hawaiian Mythology*. University Press of Hawai'i, Honolulu.
- Bennett, W.C.
1931 *Archaeology of Kaua'i*. B.P. Bishop Museum Bulletin No. 80. Honolulu.
- Bushnell, T., and H. Hammatt
1996 *Archaeological Investigation of Pu'uopae (Kalama) Bridge in Wailua Homesteads, South Olohena Ahupua'a, Puna District, Kauai, Hawaii*. Cultural Surveys Hawaii, Inc., Kailua.
- Bushnell, K.W., M. Mann, D. Borthwick, T. Bush, T. Tulchin, D. Shideler, and H.H. Hammatt
2002 *Archaeological Inventory Survey For the Proposed Kapa'a/Keālia Bike and Pedestrian Path, Kapa'a and Keālia, Kawaihau District, Kaua'i Island, Hawai'i*. Prepared for SSFM International Inc. Cultural Surveys Hawaii, Inc., Kailua.
- Calis, I.
2000 *End of Field Work Report: Human Burial Removal and Archaeological Monitoring, Kapa'a Beach Park Public Bathroom Installation, Kapa'a, Kaua'i*. Scientific Consultant Services, Inc., Honolulu.
- Chinen, Jon
1958 *The Great Mahele*. University of Hawai'i Press, Honolulu.

1961 *Original Land Titles in Hawaii*. Library of Congress Catalogue Card No. 61-17314.
- Condè, Jesse and Gerald Best
1973 *Sugar Trains, Narrow Gauge Rails of Hawaii*. Glenwood Publishers. Felton, California.
- Cook, Chris
1999 *Kaua'i, the Garden Island: A Pictorial History of the Commerce and Work of the People*. Donning Co., Virginia Beach.

Dagher, C., and R. Spear

2012 *A Cultural Impact Assessment of the Kapahi Bridge (State /Site 50-30-08-2157) Bridge Number 007460021146001 Kapaa Homesteads I Series, Kapa`a Ahupua`a, Kawaihau District, Kaua`i Island, Hawai`i [TMK: (4) 4-6-004].* SCS, Inc., Honolulu.

Daws, Gavin

1968 *Shoal of Time.* University of Hawaii Press, Honolulu.

Dega, Michael and James Powell

2003 *Archaeological Monitoring During Phase I of the Kauai Rural Fiber Optic Duct Lines Project, Kaua`i Island, Hawai`i.* Scientific Consultant Services, Inc., Honolulu.

Dole, Charles S.

1916 "The Hui Kawaihau" pp.8–15. *A Paper read at the November meeting of The Kauai Historical Society* on Nov. 16, 1916 in Lihu`e, Kaua`i.

Dorrance, William and Francis S. Morgan

2000 *Sugar Islands.* Mutual Publishing. Honolulu.

Earle, Timothy

1978 "Economic and Social Organization of a Complex Chiefdom: The Halelea District, Kaua`i, Hawaii." *Anthropological Papers No. 63.* University of Michigan, Ann Arbor, Michigan.

Folk, W.H., and H.H. Hammatt

1991 *Addendum to Archaeological Survey and Subsurface Testing at Waipouli, Kaua`i, State of Hawaii, Site No. 50-30-08-1836.* Cultural Surveys Hawaii, Inc., Kailua.

Folk, W.H., R. Chiogioji, M.J. McDermott, and H.H. Hammatt

1991 *Archaeological Survey and Subsurface Testing at Waipouli, Kaua`i, State of Hawaii, Site No. 50-30-08-1836.* Cultural Surveys Hawaii, Inc., Kailua.

Foote, D.E., E. Hill, S. Nakamura, and F. Stephens

1972 *Soil Survey of the Islands of O`ahu, Maui, Molokai, and Lanai, State of Hawaii.* U.S. Department of Agriculture Soil Conservation Service, Washington. D.C.

Giambelluca, T.W., M.A. Nuller, and T.A. Schroeder

1986 *Rainfall Atlas of Hawai`i. Report R76.* Water Resources Research Center, University of Hawai`i, Manoa, for the Department of Land and Natural Resources, State of Hawai`i, Honolulu.

Hammatt, H.H.

1991 *Archaeological Testing Results for a 12-Acre Property, Coconut Plantation, Waipouli, Kaua`i.* Cultural Surveys Hawaii, Inc., Kailua.

Handy, E.S.C., and E.G. Handy

- 1972 *Native Planters in Old Hawaii*. B.P. Bishop Museum Bulletin No. 233. Honolulu.
- Joesting, Edward
 1987 *Kauai, The Separate Kingdom*. University of Hawaii Press and Kauai Museum Association, Limited. Honolulu.
- Jourdane, Elaine and Sara Collins
 1996 *Field Inspection of Inadvertent Burial Reported at Keālia, Kauai (KPD Case # 96-09757 Lt. Martin Curran KPD 241-6763) Keālia, Kawaihau, Kauai TMK: 4-7-03:2*
- Kamakau, Samuel
 1964 *Ka Po'e Kahiko*. Bishop Museum Publication 51. B.P. Bishop Museum, Honolulu.
 1991 *Nā Mo`olelo a Ka Po`e Kahiko*. Bishop Museum Press, Honolulu.
- Kame`eleihiwa, Lilikā
 1992 *Native Land and Foreign Desires: Pehea La E Pono Ai?* Bishop Museum Press, Honolulu.
- Kauai Historical Society
 1991 *The Kauai Papers. A Kauai Historical Society Publication*. Lihue.
- Kelly, Marion
 1983 *Nā Māla o Kona: Gardens of Kona*. Department of Anthropology Report Series 83-2. Bishop Museum, Honolulu.
 1998 *A Gunboat Diplomacy, Sandalwood Lust and National Debt*. In *Ka Wai Ola o OHA*, Vol. 15, No. 4, April 1998.
- Kirch, Patrick
 1985 *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory*. University of Hawaii Press, Honolulu.
- Kirch, Patrick V. and Marshall Sahlins
 1992 *Anahulu*. Vol. 1 and 2. University of Chicago Press, Chicago.
- Kuykendall, R.S.
 1938 *The Hawaiian Kingdom*. Vol. 1. University of Hawai'i Press, Honolulu.

- Lucas, Paul F. Nahoia
 1995 *A Dictionary of Hawaiian Legal Land-terms*. Native Hawaiian Legal Corporation. University of Hawai`i Committee for the Preservation and Study of Hawaiian Language, Art and Culture. University of Hawai`i Press, Honolulu.
- Lyons, C.J.
 1875 *A Land Matters in Hawaii*. The Islander, Vol. I. Honolulu.
 1903 "A History of the Hawaiian Government Survey with notes on Land Matters in Hawaii." *Hawaii Gazette*. Honolulu.
- Macdonald, G.A., and A.T. Abbott
 1970 *Volcanoes in the Sea*. University Press of Hawaii, Honolulu.
- Moffat, Riley M. and Gary L. Fitzpatrick
 1995 *Surveying the Māhele*. An Editions Book. Hong Kong.
- Schmitt, Robert C.
 1973 *The Missionary Censuses of Hawaii*. Bishop Museum, Honolulu.
- Spencer Mason Architects
 1989 *Historic Bridge Inventory: Island of Kauai*. Prepared for the State of Hawaii Department of Transportation, Highways Division, in cooperation with the U.S. Department of Transportation, Federal Highway Administration, Honolulu, HI.
- State of Hawai`i Administrative Rules.
 2002 *Rules Governing Procedures for Historic Preservation Review for Governmental Projects Covered Under Sections 6E-7 and 6E-8, HRS: Evaluation of Significance*. §13-275-6.
- Takaki, Ronald
 1983 *Pau Hana. Plantation Life and Labor in Hawaii*. University of Hawaii Press, Honolulu.
- Wichman, Frederick B.
 1998 *Kaua`i Ancient Place Names and Their Stories*. University of Hawaii Press: Honolulu.
- Wilcox, Carol
 1996 *Sugar Water: Hawaii's Plantation Ditches*. University of Hawai`i Press: Honolulu.

[This page intentionally left blank]

**HISTORIC
HAWAII
FOUNDATION**

VIA EMAIL TO:

TO: Kuuleialoha Santos, Chairperson
Kaua'i Historic Preservation Review Commission

MEETING DATE: Thursday, March 1, 2012
3:00 p.m.
Lihu'e Civic Center, Moikeha Building, Meeting Room 2A/2B

FROM: Kiersten Faulkner, Executive Director
Historic Hawaii Foundation
Kiersten@historichawaii.org
(808) 523-2900

RE: 'Ōpaeka'a, Pu'uopae, and Kapahi Bridge Design Presentation

Since 1974, Historic Hawai'i Foundation (HHF) has been a statewide leader for historic preservation. HHF's mission is to preserve and encourage the preservation of historic properties significant to the history of Hawai'i.

HHF has reviewed the design options submitted by KAI Hawai'i for the 'Ōpaeka'a, Pu'uopae, and Kapahi bridges. Both the 'Ōpaeka'a and Pu'uopae bridges are listed on the National Register of Historic Places (NHRP). The Kapahi bridge, while not listed on the register, is over fifty years old, and therefore its historic significance and integrity should be evaluated and weighed carefully when making planning decisions for this bridge.

The submittal from KAI Hawai'i to KHPRC lacked critical information that is needed to evaluate and provide meaningful comments on historic preservation issues. In particular, the applicant should provide:

1. A summary of the historic significance, character-defining features and elements of historic integrity (i.e. location, setting, design, materials, workmanship, association, feeling) for each of the bridges;
2. A summary of the design goals and issues that need to be addressed, which is the purpose, need and scope of the undertaking;
3. Their analysis of character-defining features, each alternative's effect on integrity, and how each alternative meets Secretary of Interior Standards for the Treatment of Historic Properties (SOI). They should identify which features are original, which would be retained and which are proposed for alteration/destruction. They should also present which elements of integrity would be affected by each of the alternatives.

Historic Hawai'i Foundation • 680 Iwilei Rd. Ste. 690 • Honolulu, HI 96817 • Tel: 808-523-2900 • FAX: 808-523-0800 • www.historichawaii.org

Historic Hawai'i Foundation was established in 1974 to encourage the preservation of historic buildings, sites and communities on all the islands of Hawai'i. As the statewide leader for historic preservation, HHF works to preserve Hawai'i's unique architectural and cultural heritage and believes that historic preservation is an important element in the present and future quality of life, environmental sustainability and economic viability of the state.

D.3., D.4., D.5.

MAR 01 2012

HISTORIC HAWAII FOUNDATION

This information is necessary in order for the KHPRC, as well as county, state and federal agencies, and members of the public to understand each alternative's potential effect on historic properties and to provide input on ways in which the adverse effect may be avoided or minimized.

Although this basic and fundamental information was not provided, HHF has preliminary comments based on the alternatives provided.

HHF strongly encourages the long term maintenance and repair of these historic bridges. They should retain their current location, as moving any of them would destroy their historic character. They should also retain their character-defining features so that they retain their historic integrity. For all three bridges the current width is a feature that should be preserved. Widening these bridges would significantly impact their historic integrity and their eligibility for listing on the NHRP.

‘Ōpaeka‘a Bridge

One of ‘Ōpaeka‘a Bridge's most visually distinctive features is the wrought iron truss system. It is imperative to maintain the historic trusses by repairing them where needed and replacing portions that are badly deteriorated with "in kind" materials. The Secretary of the Interior's Standards for Rehabilitation set forth standards and guidelines for repairing historic buildings, structures, and objects. These standards allow for a property to change over time to meet the current needs of the structure, but also seek to ensure that the major character-defining features are identified and maintained during such changes.

For ‘Ōpaeka‘a Bridge, design option two is the only option that proposes retaining the existing bridge in its current location. While we have concerns regarding some aspects of this proposal, it is the best starting point for discussion. This option proposes to reuse existing steel trusses and to repair or replace only those members that are heavily damaged; clean and paint; retain the existing stone abutments; replace the existing concrete deck with a new one that is strong enough to carry emergency vehicles; make one or two lanes; and create an unprotected pedestrian sidewalk.

Retention and repair should be made with in-kind replacement of heavily damaged members, as well as retention of the existing stone abutments. This would maintain the overall historic appearance of the bridge. Should the concrete deck need to be replaced to increase its load-bearing capacity to accommodate emergency vehicles, we do not have concerns provided that its appearance remains the same as the existing asphalt concrete deck.

‘Ōpaeka‘a bridge should not be widened, as this would dramatically affect its historic integrity. The applicant should provide data on pedestrian usage of this bridge, as we question the need for a pedestrian sidewalk on this bridge and would like to see what data supports this need. The drawing submitted to the KHPRC depicts guard rails on the bridge deck inside the trusses. These distract from the historic appearance of the trusses and should be eliminated or redesigned.

Pu‘uopae Bridge

Historic Hawai'i Foundation • 680 Iwilei Rd. Ste. 690 • Honolulu, HI 96817 • Tel: 808-523-2900 • FAX: 808-523-0800 • www.historichawaii.org

Historic Hawai'i Foundation was established in 1974 to encourage the preservation of historic buildings, sites and communities on all the islands of Hawai'i. As the statewide leader for historic preservation, HHF works to preserve Hawai'i's unique architectural and cultural heritage and believes that historic preservation is an important element in the present and future quality of life, environmental sustainability and economic viability of the state.

HISTORIC HAWAII FOUNDATION

The most important aspects of Pu'uopae Bridge lie in its visual appearance and the contribution it makes to rural feeling of the area. It is important to maintain the bridge's existing width and abutments. We would prefer that the existing steel girders remain if they are in good condition, but do not have concerns with additional girders being added to carry the load of emergency vehicles.

Again, we question the necessity of creating a pedestrian sidewalk. This would almost certainly necessitate widening the bridge, which would dramatically affect its historic integrity.

Kapahi Bridge

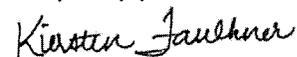
The two options presented for this bridge both involve making it either one or two lanes; replacing steel girders; a new concrete deck; new steel or concrete railings; strengthening it to carry emergency vehicles; and both propose a pedestrian sidewalk. They differ in whether or not the sidewalk is protected.

The historic railings should be retained if still extant and able to be repaired. If the current railings are not historic, the new railings should not detract from the historic character of the area. Provided that it does not change the appearance, we do not have concerns regarding the replacement of steel girders or a new concrete deck. We again have concerns regarding the widening of the bridge and question the necessity of adding a pedestrian sidewalk.

Generally we feel that the plans submitted would need to be developed further to give a better understanding of the scope of the proposed projects. The options as submitted to the KHPRC do not provide enough information to know exactly what type of work is proposed. Information such as current and proposed width and length of the bridges; current and proposed railing height; and current and desirable weight limits would help to give a fuller understanding of the proposed projects.

Thank you for the opportunity to comment.

Very truly yours,



Kiersten Faulkner, AICP
Executive Director

Cc: Ross Stephenson & Angie Westfall, State Historic Preservation Division
Larry Dill, County of Kaua'i Engineer
Pat Phung, Federal Highways Administration
Mike Hunneman, KAI Hawai'i
Tonia Moy, Fung Associates, Inc.

NEIL ABERCROMBIE
GOVERNOR OF HAWAII



RECEIVED
LAND DIVISION

2012 MAY 31 A 10:11

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
HISTORIC PRESERVATION DIVISION
KAIUHIHIEWA BUILDING
601 KAMOKILA BLVD. KAPOLEI HI 96707

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSIONER IN CHARGE
GUY H. KAULUKUKUI
FIRST DEPUTY
WILLIAM M. TAM
DEPUTY DIRECTOR - WATER
AQUATIC RESOURCES
BOARDING AND OCEAN RECREATION
BUREAU OF CONSERVATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAIKOLA ISLAND RESERVE COMMISSION
LAND
STATE PARKS

DATE: May 14, 2012 **LOG:** 2012.1021
TO: Steve Molmen **DOC:** 1205RS32
Land Division, Department of Land and Natural Resources
Post Office Box 621
Honolulu, HI 96809
SUBJECT: National Historic Preservation Act (NHPA) Section 106 Consultation
Permit # (None)
Owner: County of Kauai
Location: Kapahi Stream, Kawaihau Road, Kauai
Tax Map Key: (4) 4-6-004

Date Received by SHPD: April 4, 2012

Description of Project/Undertaking: Early consultation for Environmental Assessment for rehabilitation of Kawaihau Road Bridge over Kapahi Stream.

Area of Potential Effect (APE): Present bridge footprint, approaches, and possible realignment to connect with Piliamoo Road

Description of Resource: Originally constructed in 1937. The bridge currently consists of rubble abutments, steel girders, and timber decking.

Eligibility: Although the bridge has been altered over time (it apparently began with timber stringers, retains a timber deck and has the original abutments (*Historic Bridge Inventory, Island of Kauai, Spencer Mason Architects, 1988*), the dates of the changes made are unknown. Eligible for the Hawaii Register of Historic Places under Criteria A (Events – homesteading) and C (Architecture).

Documentation Received: Two maps, photograph of bridge from downstream

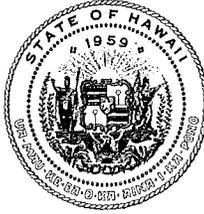
SHPD Determination: SHPD would prefer construction that retains the look and feel of the existing bridge while meeting the need for emergency vehicle access. This would include matching the existing bridge width, rehabilitated steel girders, a timber covered concrete deck, railings that match those existing, and undifferentiated pedestrian use. We attended an April public hearing and continue to welcome consultation with the County and Federal Highway Administration on this project.

Any questions should be addressed to Ross W. Stephenson, SHPD Historian, at (808) 692-8028 (office), (808) 497-2233 (cell) or ross.w.stephenson@hawaii.gov.

Mahalo for the opportunity to comment.

Angie Westfall
Architecture Branch Chief, Hawaii Historic Preservation Division

NEIL ABERCROMBIE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING
601 KAMOKILA BLVD STE 555
KAPOLEI HI 96707

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ESTHER KIA'AINA
FIRST DEPUTY

WILLIAM M. TAM
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

DATE: March 20, 2013

LOG: 2013.2096

DOC: 1303RS28

TO: Mr. Kuppusamy Venkatesan
Public Works Engineering
County of Kauai
444 Rice Street, Room 175
Lihue, HI 96766

SUBJECT: **National Historic Preservation Act (NHPA) Section 106**
Project: Kapahi Bridge replacement
Owner: County of Kauai
Address: Kapaa Stream
Tax Map Key: (4) 4-6-004

Date Received by SHPD: March 1, 2013

Description of Project/Undertaking: Replacement of existing bridge with steel girder frame, reinforced concrete deck, raised sidewalk on one side, four foot wide bicycle lane on the other. Existing abutments to remain, but support to be provided by new abutments placed behind those existing. Bike lane to be separated from traffic lane by striping. Bridge width to be increased from existing 15 feet to 22.5 feet. FHWA funds are to be used in this undertaking.

Area of Potential Effect (APE): Bridge footprint and approaches.

Description of Resource: Bridge originally constructed approximately 1937 and reconstructed in 1977. Poured-in-place concrete abutments supplemented by stone. Timber planks on steel girders. Timber railings.

Eligibility: Identified as Category III Bridge ("little historic significance") in 1989 county inventory and not included in 2008 Statewide Draft Bridge Inventory. The County of Kauai has compiled a Hawaii Intensive Architectural Survey Report for the Bridge which carries the same conclusion.

SHPD disagrees for several reasons. First, the structure uses steel stringers, a material not often used in Hawaii due to our exposure to salt air. Second, the structure also has a wood deck, which the Architectural Survey Report states was rare because of a deliberate policy by the Territorial Highways Department (and, by implication, other government transportation divisions) to replace such bridges in the 20th century with lower maintenance cost concrete bridges. Third, as architectural/engineering documentation is thin for this particular bridge prior to 1977, it cannot be determined whether the 1977 work was "maintenance" or "redesign". Fourth, the present design complements the historic rural nature of this area.

Thus, we must treat the bridge as a historic resource, eligible for the Hawaii Register under Criteria A (Events – development of roadways in the area to assist homesteading) and C (period Architecture)

Documentation Received: Photographs, Architectural Survey Report

SHPD Determination: *The project will have affect.*

This project has already had several iterations, including suggested use of the existing bridge for pedestrian access and construction of a new vehicular bridge immediately makai.

SHPD comments:

- 1) We commend the County for proposing use of steel girders in the new design. This reflects what has been on site for 35 years.
- 2) We recognize the need for emergency vehicle access to the area and support having bridges that can support the weight of such vehicles.
- 3) The current proposal would create, in effect through use of the four foot bike lane, a wider roadway that has been opposed by members of the community. As there is no designated or separate bike path to or from the bridge, we do not understand the incorporation of this feature.
- 4) Given the existing bridge has a wood plank surface, we strongly recommend that wood, or visually similar material, be placed upon the concrete deck to retain this feature. We also recommend that the existing railing be replicated to also retain character.
- 5) A raised sidewalk is proposed on one side. This should also be covered with wood or a wood-like material to retain the rural character of the bridge. The height of the sidewalk could be designed so that, in emergencies, the width of the sidewalk could be employed to facilitate multiple emergency vehicle access.
- 6) The present alignment of the bridge is such that right turns from the bridge have become an issue. We request that any design accommodate a wider turning radius by using space off the bridge rather than on it.

We look forward to your response.

Any questions should be addressed to Ross W. Stephenson, SHPD Historian, at (808) 692-8028 (office) or ross.w.stephenson@hawaii.gov.

Mahalo for the opportunity to comment.



Angie Westfall
Architecture Branch Chief, Hawaii Historic Preservation Division

In the event that historic resources, including human skeletal remains, lava tubes, and lava blisters/bubbles are identified during construction activities, all work should cease in the immediate vicinity of the find, the find should be protected from additional disturbance, and the State Historic Preservation Division should be contacted immediately at (808) 692-8015.

COUNTY OF KAUAI
PLANNING DEPARTMENT
4444 RICE STREET, SUITE A473
LIHUE, KAUAI, HAWAII 96766-1326

MEMORANDUM

DATE: November 25, 2013

TO: Michael Hunnemann, Kai Hawai'i Inc.
31 North Pauahi Street, Second Floor
Honolulu, Hawai'i 96817

FROM:  Kauai Historic Preservation Review Commission 

SUBJECT: Department of Public Works Requesting to present Conceptual Design Plans for Kapahi Bridge, Federal Aid Project No. BR-0700(53)

This is to inform you that the Kauai Historic Preservation Review Commission (KHPRC) met on November 7, 2012 to review and discuss the conceptual design plans for the Rehabilitation/Repair of the Kapahi Bridge as contained in your letter and attachments of September 18, 2013.

Based on the information presented at the meeting, the conceptual design plans were developed based upon previous comments from the KHPRC and comments from the community. In summary, the conceptual design plan on the Kapahi Bridge include retaining the one lane bridge design and retaining the existing 16 ft. width of the bridge, for safety purposes the design include the use of sharrows along the bridge, installation of timber deck planks placed transversely on the bridge, A/C overlay at both ends of the bridge, new bridge railing (painted white) to resemble existing railing, use of same sized steel girders, existing abutment to remain, and installation of end wall to hide extended girders.

Following the presentation, the Consultant, in behalf of the Department of Public Works (DPW), requested "no adverse effect" from the KHPRC under the following conditions as represented:

- Maintain existing width
- Add timber deck planks placed transversely on top of concrete deck

Based on the information and testimony presented, the KHPRC voted to accept the "no adverse effect" of the proposed plans for the Kapahi Bridge.

Please feel free to contact us if you have any questions regarding this matter.

Mahalo.

cc: State Historic Preservation Division
Department of Public Works



U.S. Department
of Transportation
**Federal Highway
Administration**

Hawaii Federal-Aid Division

January 15, 2014

300 Ala Moana Blvd, Rm 3-306
Box 50206
Honolulu, Hawaii 96850
Phone: (808) 541-2700
Fax: (808) 541-2704

In Reply Refer To:
HDA-HI

Mr. William J. Aila, Jr.
Chairperson and State Historic Preservation Officer
State of Hawaii Department of Land and Natural Resources
601 Kamokila Boulevard, Suite 555
Kapolei, HI 96707

Subject: National Historic Preservation Act Section 106 Consultation
Kapahi Bridge Rehabilitation
District of Kawaihau, Island of Kauai, Ahupuaa of Kapaa
Federal-aid Project No. STP-0700(53)
Tax Map Key: (4) 4-6-004

Dear Mr. Aila:

In accordance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (2006), the Federal Highway Administration (FHWA) requests the State Historic Preservation Officer's concurrence on the effect determination for the proposed improvements. The FHWA is rendering a no adverse effect determination for the subject project.

The FHWA intends to provide funds for the proposed improvements. Therefore, the FHWA has required the State of Hawaii Department of Transportation (HDOT) and County of Kauai to comply with the National Environmental Policy Act, NHPA, and other federal requirements. The FHWA has authorized the HDOT and the County of Kauai to act on behalf of the FHWA regarding the NHPA Section 106 notification and consultation.

Overview of the Undertaking

1. Area of Potential Effects (APE): The APE aerial photograph (see enclosed) shows that this bridge is visible to the general public from the nearby roads and the stream. Therefore, the APE includes the area around the bridge and the paved area in the County of Kauai right-of-way. Staging areas are included in the APE. Should the staging area change due to conditions during construction, all interested parties will be notified and given the opportunity to comment. Acreage of APE: 2.9 acres.

2. Description of undertaking and nature of federal involvement: The proposed project will be a bridge rehabilitation project and will be partially funded through the FHWA. Enclosed are the conceptual drawings for the repair project. The following are highlights of this project.
 - a. New concrete deck to replace steel beams.
 - b. Wood planks in same pattern and size as existing will be placed above concrete deck with spacers to allow drainage and wood to breathe.
 - c. New concrete abutments to be located behind existing abutments to carry new deck loads.
 - d. New deck system strong enough to carry any emergency vehicle of current size/weight.
 - e. Steel crash-tested railings to resemble the wood railings, painted white.
 - f. Extension of deck to be asphalt pavement, not wood.
 - g. A wing wall will hide the extra length of bridge deck from exterior view.

3. Steps taken to identify historic properties: The bridge has been determined to be eligible for listing on the Hawaii and National Registers of Historic Places per the enclosed letter from the State Historic Preservation Division (SHPD). An Archaeological Inventory Survey (AIS) was also completed to identify any archaeological resources and results are noted in a report that was sent to the SHPD and summarized below.

4. Photographs of existing conditions: Please see enclosed photos.

Consultation Overview

The County of Kauai consulted with the Department of Land and Natural Resources (DLNR) SHPD, Kauai Historic Preservation Review Commission (KHPRC), Historic Hawaii Foundation (HHF), and the surrounding communities through various meetings. Enclosed are minutes from the various meetings to include the following:

- Two community meetings with representatives from the HHF, KHPRC and SHPD attending one or both;
- Two KHPRC presentations; and,
- Two meetings (one via telcon) with representatives from the SHPD, KHPRC, County of Kauai, HHF and the consultants present.

Section 106 consultation letters, dated between December 12, 2011, and January 18, 2012, were sent to the following organizations and individuals:

- Pat Griffin, historian;
- Andy Bushnell, historian;
- Ron Terry of Geometrician, LLC;
- Tonia Moy, Fung Associates, Inc.;
- Allan Smith, community member;
- Kiersten Faulkner, Executive Director of the HHF;
- Jan Tennbrugnengate, reporter;

- Cheryl Lovell-Obatake, community member and previous Kauai/Niihau Island Burial Council member;
- Spencer Leineweber, of The Heritage Center;
- Clyde Namuo, Director of the Office of Hawaiian Affairs (OHA);
- Dr. Abba G. Lichtenstein, Advisory Board member of the Historic Bridge Foundation;
- Ms. Rayne Regush, Kapaa Community Neighborhood Board;
- Mr. Richard Pezzulo, Chief Operating Officer of the Office of Hawaiian Affairs, and,
- Mr. Erik Burton, Operations Director at the Ethnobotany Research and Applications Journal.

In an electronic transmittal (to Cathleen Dagher dated November 7, 2011) Pat Griffin stated that “[b]oth Puuopae and Opaekaa are on the National Register of Historic Places.....” and that “...Cultural Surveys did an assessment for Puuopae –some time before 2004...” Ms. Griffin also stated that “...[t]hese bridges, along with the one-lane bridge on Kalama Road (local folks here know it as Yasutake’s Bridge--as with Opaekaa, it has parts from the old Wailua River Bridge...[and] are part of a network of passages that tell a strong story about the history of homesteading on Kauai in the early territorial period.” Ms. Griffin also recommended Dr. Abba G. Lichtenstein, who submitted plans for the bridges to the Kauai County Department of Public Works during the proposal period around 1993, Andy Bushnell, and Kiersten Faulkner as individuals knowledgeable about the area.

Andrew Bushnell responded via e-mail (dated November 23, 2011) and stated

“The person who you really need to speak with is Pat Griffin.... Several years ago she did considerable research on both the Puuopae and Opaekaa bridges... At the time that the issue of the bridges came up several years ago, I approached several of the old-timers about the bridge. The only one who had anything to share with me was Sam Hepa Sr. who has since died. He recalled walking from Olohena Road along Puuopae Road on his way to Olohena School. He said that every once in a while he would cross the Puuopae Bridge by climbing the superstructure that used to be part of the bridge but has since been removed. He confirmed that the present bridge is the same bridge that was there in the 1930s when he was growing up.”

Kiersten Faulkner, Executive Director of HHF, provided the following comments via e-mail (dated December 9, 2011):

I assume that you have the National Register nomination forms for both Puuopae and Opaekaa bridges. These are the resource documents that describe the history and significance of the bridges themselves. They also include the research bibliography with additional source materials if you do original research. In addition, the County has drawings and plans related to the bridges. The Wailua Homesteads has a 100-year old history that you can research

at the Kauai Historical Society. The Garden Island newspaper archives may also be helpful.

In a letter postmarked January 3, 2012, Ms. Dagher received a copy of letter from Barnes Riznik, previous Director Emeritus Grove Farm Museum and professional historian, to Larry Dill, Kauai County Engineer, previously of the Historic American Engineering Board, stating that he and Donald Jackson had physically examined and described Opaekaa Bridge in an historical context and published the results (Jackson and Riznik 1978). Mr. Riznik stated in his January 2012 letter that "... [f]or the first time, in 1978 the Opaekaa Bridge was recognized as historically significant in Hawaii; moreover, the bridge was identified nationally as the only British-made iron bridge in America." Mr. Riznik goes on to say that in the 1990s he "...participated in meetings of the County Public Works Department staff, and its engineering consultants from Honolulu and the Mainland, who considered the Opaekaa Bridge worthy of repair..." Mr. Riznik closed the letter stating that he "...can only hope that the present comprehensive review of the bridge will produce a preservation rehabilitation plan for stabilization --- and continued practical use --- of this surviving historical structure on Kauai."

Ron Terry recommended Allan Smith as an individual from the community knowledgeable about the project area (electronic transmittal from Mr. Terry to Cathleen Dagher dated November 23, 2011).

On February 8, 2011, Scientific Consultant Services (SCS) received an electronic transmittal (via e-mail) from Margery Freeman, a member of the community, stating that:

The three bridges that are covered by this assessment are near my home on Kauai. There are a number of reasons these bridges should be kept as one lane bridges.

- 1) They are historic
- 2) The[y] (sic) slow down traffic
- 3) They are safer tha[n] (sic) having people rush around on wide streets. The studies of their accidents are misleading. Most of those problems happened a mile or two away from the bridge so are not relevant to the bridge.
- 4) There is very little traffic on any of them
- 5) They contribute to keeping our rural life style which is very important to us.
- 6) Especially the Opaekaa [B]ridge is attractive and interesting because of its look and its historic past.

On February 17, 2012, SCS received an electronic transmittal (via e-mail) from Larry LaSota, a member of the community who resides between the Opaekaa and Puuopae Bridges in Wailua Homesteads. Mr. LaSota expressed concerns similar to Ms. Freeman's in that the one-lane bridge systems should not be replaced as they help to slow down traffic. Mr. LaSota further stated that "... [t]hese bridges are perfect the way they are (one lane) and should be kept that way" as replacing the bridges will alter the character of the neighborhood.

On February 21, 2012, SCS received an electronic transmittal (via e-mail) from Rayne Regush, community member. Ms. Regush believes the Puuopae, Opaekaa, and Kapahi Bridges "...maintain the rural agricultural tradition of these communities; provide a touchstone contrasting territorial history and modern times; prompt us to embrace a slower pace of life; provide a rural/country feeling and charming experience; engender friendliness by yielding to oncoming traffic; serve as cultural landmarks of our rural communities; provide a source of community pride; and connect us to earlier times and offers opportunities for education..." Ms. Regush goes on to say that "... [t]he traditional activities that may be impacted are the same activities or intrinsic qualities that are identified in the HDOT's Scenic Byways Program.

- They have scenic qualities which provide a heightened experience. The landscape and bridge-scapes are striking and memorable.
- The natural qualities of the environment (the stream, fish, plants, and wildlife) remain relatively undisturbed by manmade interventions.
- They have historic qualities. The bridges are legacies of the past which are historically significant. The bridges instill an appreciation for the past. They reflect the territorial days of agricultural settlements in these communities and continue to exemplify the tradition of a rural lifestyle today.
- These century old bridges have archeological qualities. And, a strong likelihood of the streams used traditionally for bathing.
- Recreational qualities such as the passive enjoyment of the landscape. As a pedestrian there is the opportunity for nature-watching, quietude and contemplation. Driving on the bridge is a pleasurable recreational experience as well."

Ms. Regush suggested contacting Erik Burton as an individual knowledgeable about traditional lifeways and cultural practices conducted in the area of the three bridges. On February 28, 2012, SCS initiated consultation with Mr. Burton, via e-mail.

On March 3, 2012, SCS received an electronic transmittal (via e-mail) from Mr. Erik Burton, Operations Director at the Ethnobotany Research and Applications Journal, stating:

As to the Puuopae and Opaekaa bridge areas, I have found no specific written accounts of that area, other than general reports of a lushly farmed upland. The alii did have several sacred bathing ponds, and there are a number of sacred sites (and some scary ones) in the Wailua area – many not with state site numbers. After the industrial agricultural period, much of the area was scraped clean. The gullies and river flatlands are mostly preserved.

The agricultural complexes for Wailua Ahupuaa continue all the way to the base of Waialeale, where the village of Kauhau protects the lua trail up to the Alakai. Considering that Wailua was so developed, and looking at the lay of the land in these areas, my predictive model indicates that there were loi all along the

Opaekaa Stream. With Wailua's peak population pushing all the way to the base of Waialeale, they surly (sic) cultivated these easy to access and irrigate, gently sloping uplands. We are only at about 370' elevation, so the growing climate here is good for many things.

In addition, on December 14, 15, and 18, 2011, Section 106 notice/advertisement have been included in The Honolulu Star-Advertiser and The Garden Island News; on January 18, 19, and 22, 2012, in The Garden Island News only, and in the December issue of the OHA newspaper, Ka Wai Ola regarding the undertaking. Native Hawaiian organizations and Native Hawaiian descendants with ancestral lineal or cultural ties to, cultural knowledge or concerns for, and cultural or religious attachment to the proposed project area were requested to contact Cathy Dagher of SCS.

Meetings and communications included the following. For more detail, minutes are also enclosed.

- December 7 & 8, 2011: Two community meetings announced in The Garden Island News and flyers posted in the neighborhood. Attended by approximately 28 people at each meeting. Initial reactions by community were concerns that this project had started many years ago and has not been done yet. Safety for the community was of great concern and many expressed the desire for a wider, stronger bridge.
- March 1, 2012: Presentation to the KHPRC to show various design options for bridge. KHPRC preferred existing one lane bridges.
- April 11, 2012: Two meetings at Kapaa Middle School announced in The Garden Island News were conducted to provide more information to community and to get initial reactions to various design options. Emergency vehicle operators attended, as well as approximately 30 people including two representatives from the SHPD and one from the HHF. Greatest concern for emergency vehicle operators was safety and a bridge that can carry the emergency vehicle weight and size. Though some community members expressed safety concerns of a one-lane bridge and possible accidents, many community members expressed great concern to keep the rural character of the bridge.
- March 6, 2013: Presentation to the KHPRC to show County of Kauai's preferred alternative for Kapahi Bridge. The design shown, which indicated a 12' wide vehicle lane, 4' wide sidewalks and 4' wide bike lane, would result in an adverse effect and 4f analysis.
- In early 2013 a traffic study was conducted and it was concluded that a one lane bridge is sufficient for any expected increases in population or development of the area.
- July 23, 2013: Combination telcon and meeting with representatives from the HHF, KHPRC, FHWA, Kauai County and HDOT. Design shown was a one lane bridge with any replacement done in the same design intent as the existing bridge. Some details were discussed and altered per discussion. The SHPD requested more information.

- August 14, 2013: Telcon with above attendees to discuss effect determinations. Enclosed drawings reflect changes done to the design per the telcon. Minutes of this meeting are also enclosed. A no adverse effect with conditions was generally agreed upon and was further confirmed through email distribution of the minutes.
- November 7, 2013: Presentation to the KHPRC was done to summarize the consultation efforts and to request a concurrence with above mentioned direction for a no adverse effect with conditions. KHPRC concurred.
- November 20, 2013: Public meeting at Kapaa Middle School announced in The Garden Island News was conducted to inform the community of the conceptual design chosen.

Historical, Cultural, and Archaeological Background

The current bridge location does not itself fall into any Land Commission Awards or land grants. However, there are adjacent lands which are demarcated as land grants and land court applications. A majority of these inland claims were associated with streams, where wetland taro was produced and house sites were scattered about the agricultural area.

Commercial sugarcane agriculture came to Kealia during the middle to late 19th century. According to Dorrance and Morgan (2000), the Kealia Sugar Plantation was in operation from 1869 until 1885. The Makee Sugar Company ran from 1877 until 1933.

By the mid-Twentieth Century, many of the homesteaders in the area, who had grown sugarcane and pineapple for the larger companies, were occupied in fields other than agriculture, and the homesteads became more residential in nature. The bridge was built to service the homesteads.

See enclosed AIS for more details.

Summary of Archaeological Sites within the APE

During the current AIS, State Site 50-30-08-2157, the Historic Period Kapahi Bridge, was re-located. State Site 50-30-08-2157 has been evaluated and found to be significant under Criterion D, for information content. According to Spencer Mason (1989), the Kapahi Bridge has integrity in terms of original location (Moalepe Stream). Kapahi Bridge also has limited artistic value as exhibited in the geometrical white lines of the railing and the positioning of the sloping braces. However, the structural integrity of the Kapahi Bridge has been altered (Spencer Mason Architects 1989). While some of the original bridge components were retained, most of the components supporting the bridge have been replaced with steel. The steel stringer/multi-beam structural type is not unique, as there are other bridges on island which exhibiting the same structural type.

No additional significant archaeological sites/historic properties were identified in the project area APE.

Effect Determination

Based on our analysis, site observations, and consultation with the SHPD, KHPRC, HHF and other interested parties and individuals, the FHWA has determined no adverse effect with the following conditions.

- Qualified personnel meeting the Secretary of Interior's Standards for historic architect will be included in the review process.
- Above qualified personnel will also be involved in the review of designated submittals by contractor, such as shop drawings or requests for substitutions, and at key milestones in the construction process.
- The SHPD will review at phases such as 65% design, 100% design and specifications to ensure the above design direction is followed.

Mitigation Policies

Mitigation measures during the construction of the proposed improvements have been and will continue to be implemented to avoid and minimize potential impacts to archaeological, cultural, and historic resources. The following mitigation measures have been or will be implemented, at a minimum:

- If cultural materials are discovered during construction, all earth-moving activity within and around the immediate discovery area will be diverted until a qualified archaeologist can assess the nature and significance of the find.
- If human remains are discovered, Hawaii Administrative Rules Title 13, Subtitle 13, Chapter 300 states that further disturbances and activities shall cease in any area or nearby area suspected to overlie remains, and SHPD and Police Department will be contacted. The appropriate process would then proceed in conformance with Hawaii Administrative Rules §13-300 Subchapter 4 "Procedures for Property Treatment of Burial Sites and Human Skeletal Remains."

The County of Kauai will prevent the disturbance or taking of any historic property or resource to the extent possible by instituting these mitigation measures and enforcing their implementation by contractors.

If the SHPD objects to the no adverse effect determination with the above conditions for the Kapahi Bridge Rehabilitation, please inform us within 30 days of receipt of this letter. In the absence of a SHPD response by this date, the FHWA will assume the SHPD concurrence with this determination and will proceed with the undertaking.

If you have any questions, please feel free to contact me at (808) 541-2316 or by email at meesa.otani@dot.gov if you have any questions.

Sincerely yours,



Meesa T. Otani
Environmental Engineer

Enclosures

cc: Christine Yamasaki (HDOT), Todd Nishioka (HDOT), Larry Dill (County of Kauai), Michael Gushard (SHPD), Michael Hunnemann (Kai Hawaii, Inc.), Pat Griffin (KHPRC), Kiersten Faulkner (HHF)

COUNTY OF KAUAI
PLANNING DEPARTMENT
4444 RICE STREET, SUITE A473
LIHUE, KAUAI, HAWAII 96766-1326

MEMORANDUM

DATE: November 25, 2013

TO: Michael Hunnemann, Kai Hawai'i Inc.
31 North Pauahi Street, Second Floor
Honolulu, Hawai'i 96817

FROM:  Kauai Historic Preservation Review Commission 

SUBJECT: Department of Public Works Requesting to present Conceptual Design Plans for Kapahi Bridge, Federal Aid Project No. BR-0700(53)

This is to inform you that the Kauai Historic Preservation Review Commission (KHPRC) met on November 7, 2012 to review and discuss the conceptual design plans for the Rehabilitation/Repair of the Kapahi Bridge as contained in your letter and attachments of September 18, 2013.

Based on the information presented at the meeting, the conceptual design plans were developed based upon previous comments from the KHPRC and comments from the community. In summary, the conceptual design plan on the Kapahi Bridge include retaining the one lane bridge design and retaining the existing 16 ft. width of the bridge, for safety purposes the design include the use of sharrows along the bridge, installation of timber deck planks placed transversely on the bridge, A/C overlay at both ends of the bridge, new bridge railing (painted white) to resemble existing railing, use of same sized steel girders, existing abutment to remain, and installation of end wall to hide extended girders.

Following the presentation, the Consultant, in behalf of the Department of Public Works (DPW), requested "no adverse effect" from the KHPRC under the following conditions as represented:

- Maintain existing width
- Add timber deck planks placed transversely on top of concrete deck

Based on the information and testimony presented, the KHPRC voted to accept the "no adverse effect" of the proposed plans for the Kapahi Bridge.

Please feel free to contact us if you have any questions regarding this matter.

Mahalo.

cc: State Historic Preservation Division
Department of Public Works



FUNG ASSOCIATES INC.

architecture ■ preservation ■ planning ■ interiors

MEETING MINUTES

By: Tonia Moy
July 24, 2013

Project: Section 106/Chapter 6E consultation for three County of Kauai bridges
Kapahi Bridge
Puuopae Bridge
Opaekaa Bridge

Meeting Date: July 23, 2013

Time: 10:30 am

Location: HDOT conference rooms, Kapolei, Kauai and Honolulu

Attendees: Angie Westfall and Michael Gushard (SHPD); Kiersten Faulkner and Tanya Gumpac-McGuire (HHF); Pat Griffin (KHPRC); Meesa Otani (FHWA); Lee Steinmetz, Wallace Kudo (Kauai County); Tonia Moy (FAI); Ray McCormick and Kuppusamy Venkatesan remained for the first half of the meeting

The following items were discussed and confirmed at the meeting. Comments and corrections to this report should be addressed to the report preparer within 3 days from the date of the report or these minutes will be recorded.

Latest drawings of the above three bridges were shared with the meeting attendees (see attached drawings). Attached drawings are updated and clarified with dimensions per request at meeting.

Overall

- Preservation partners believe that designs have come a long way
- The look of the historic resource is more critical than the actual material, i.e. if steel can better resemble wood railings, then will use steel
- SHPD would like more information on each bridge as need to transition from Ross Stephenson

Opaekaa Bridge

Proposed bridge design

- Existing width will be kept
- Existing abutments will be kept
- Existing bridge length will be visually kept
- New abutments outside the existing will be added
- New concrete deck will be supported by new abutments
- Existing sides (visible truss portion) of the bridge will be cleaned and fixed



FUNG ASSOCIATES INC.

architecture ■ preservation ■ planning ■ interiors

- Crash tested railings will be added

Comments

- SHPD would like to see elevation drawing from the river side (not only cross section) to determine if crash tested railings have an adverse visual impact. Include the following dimensions
 - Height of existing truss
 - Height of new approach guard rails
 - Height of new guard rails
- Agreed that rather than have the crash tested railings appear integral to the trusses, should have railings be as non-obtrusive as possible. Square tubing preferable to round tubing.
- Some conditions to include in the documents:
 - Ensure cleaning and repair work to original trusses follow the Secretary of Interior Standards and NPS technical briefs
 - Recommend hiring a specialist in steel conservation/preservation to determine how much of the steel really needs replacement vs. how much just needs patching or cleaning
 - Research to find original color of trusses
 - Pat Griffin to check with Barnes Riznik
 - Analyze paint chip if can find on existing

Puuopae Bridge (Kalama Stream Bridge)

Proposed bridge design

- Existing width will be kept
- Existing abutments will be kept
- Existing bridge length will be visually kept
- New abutments outside the existing will be added
- New concrete deck will be supported by new abutments
- Two options were presented
 - A more current engineering concept of a flat concrete slab
 - A replication of the historic deck consisting of I-beam steel encased in concrete
- Existing end posts will be kept
- New steel girders will be added on the inside of the existing steel girders (replacement of the existing girders in kind may be recommended)

Comments

- Questions about period of significance and what is being preserved
 - It was noted that the period of significance on nomination is 1912-1936
 - Also noted is that bridge is significant under Criterion A only
 - However, it was also noted that the current bridge is what was placed on the register, not the truss bridge
- Bridge does not resemble the earlier truss bridge, however it does maintain the original steel girder deck
- Suggestion was made to restore the trusses as a decorative feature to restore to period of significance
- Pat Griffin noted that the railings that were on the bridge from 1958 to 2000 would be the most feasible to restore. See attached photocopy from the 1989 Spencer Mason report that shows the railings at that time.



FUNG ASSOCIATES INC.

architecture ■ preservation ■ planning ■ interiors

- Preference is to replace the deck in kind as shown in option 2
- SHPD requested more photos and possibly archival photos to better analyze the changes that have occurred.
- Recommend using same specialist as noted for Opaekaa Bridge to make recommendations on how to treat end posts.

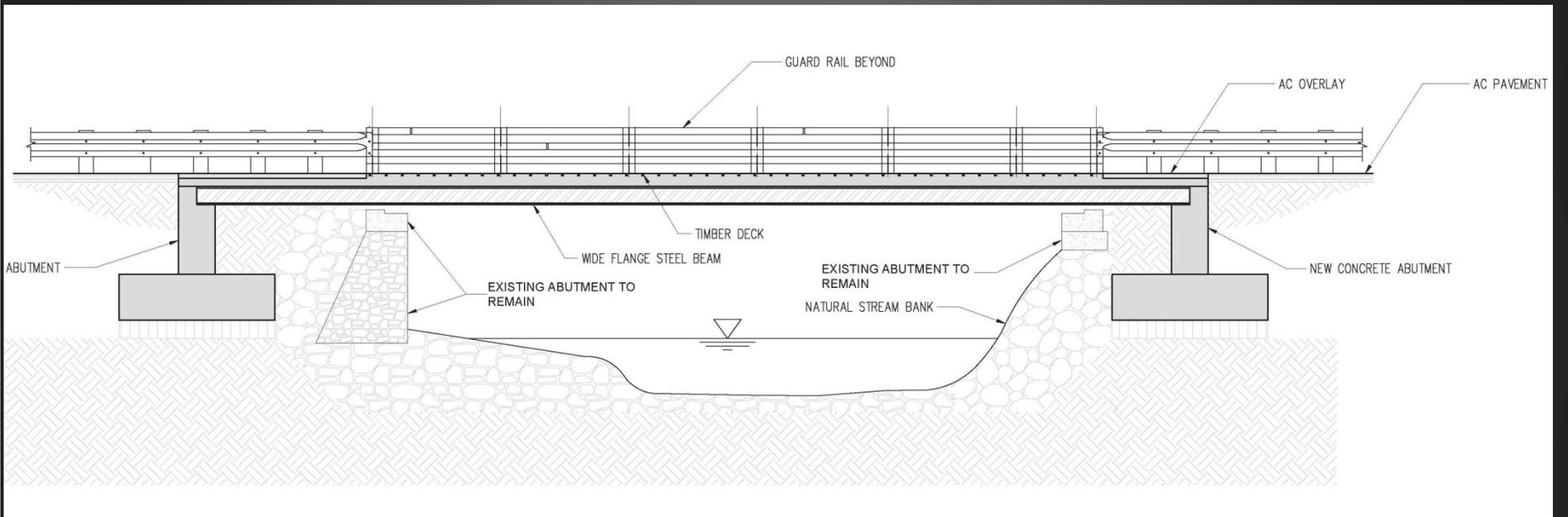
Kapahi Bridge

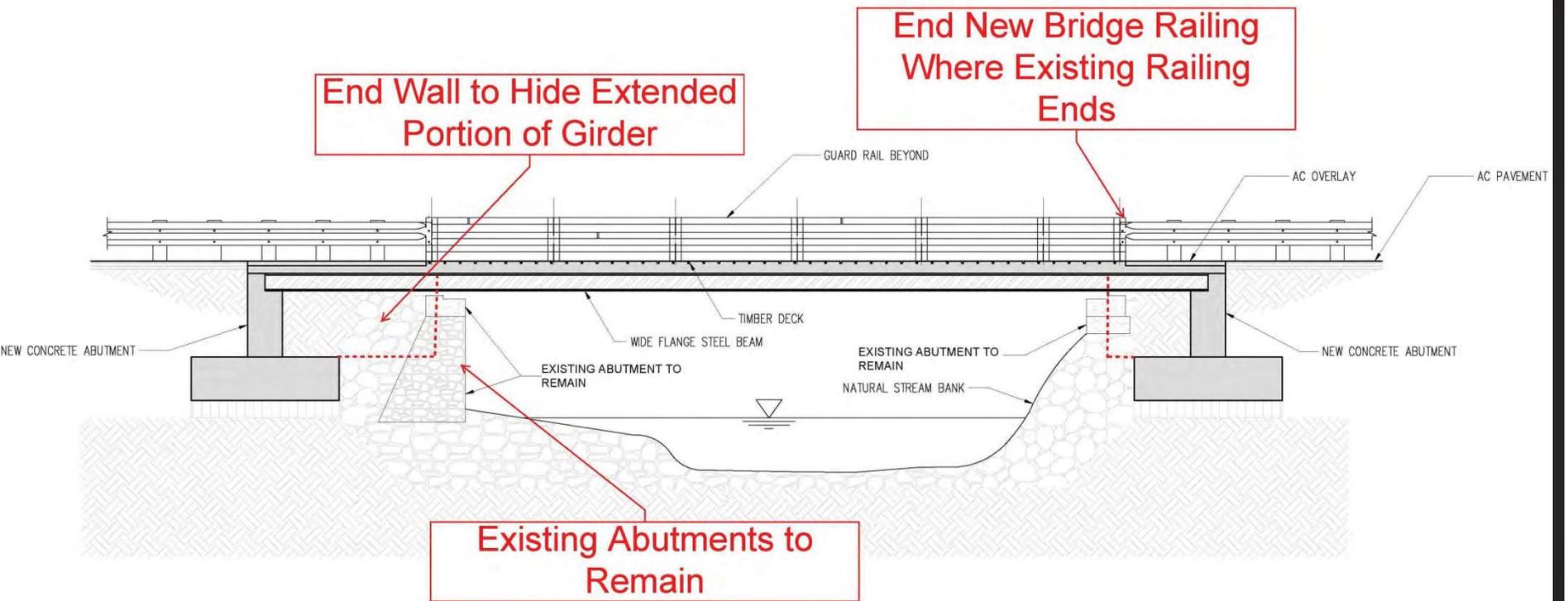
Proposed bridge design

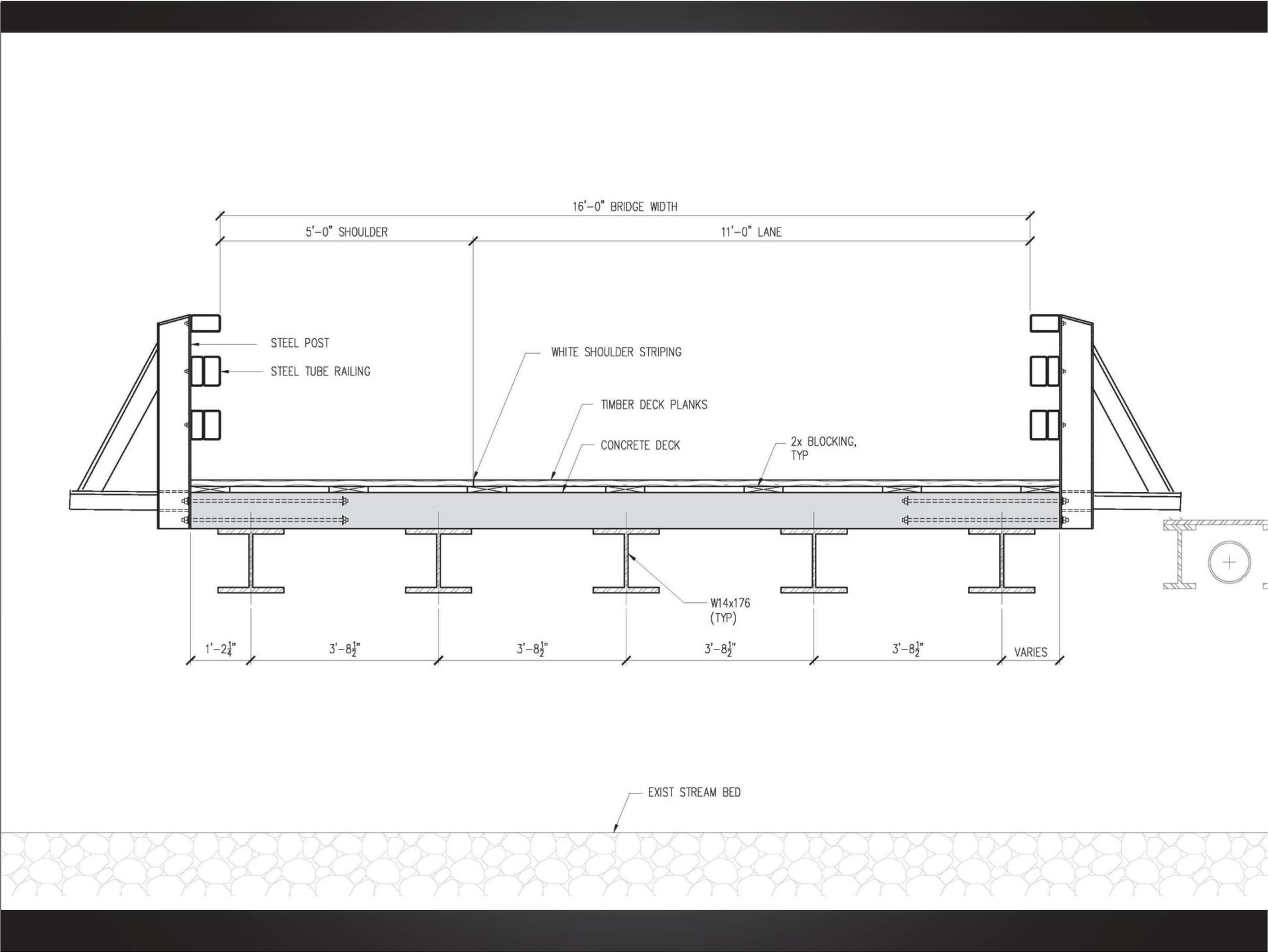
- Existing width will be kept
- Existing abutments will be kept
- Existing bridge length will be visually kept
- New abutments outside the existing will be added
- New concrete deck will be supported by new abutments
- Utilize stamp concrete to resemble wood planks
- Two options on crash tested railings
 - Timber railing which is more massive in appearance to meet crash testing
 - Steel railings painted white to resemble the existing wood railings
- Project team believes the proposed will be an adverse effect, which will require an MOA and 4F analysis

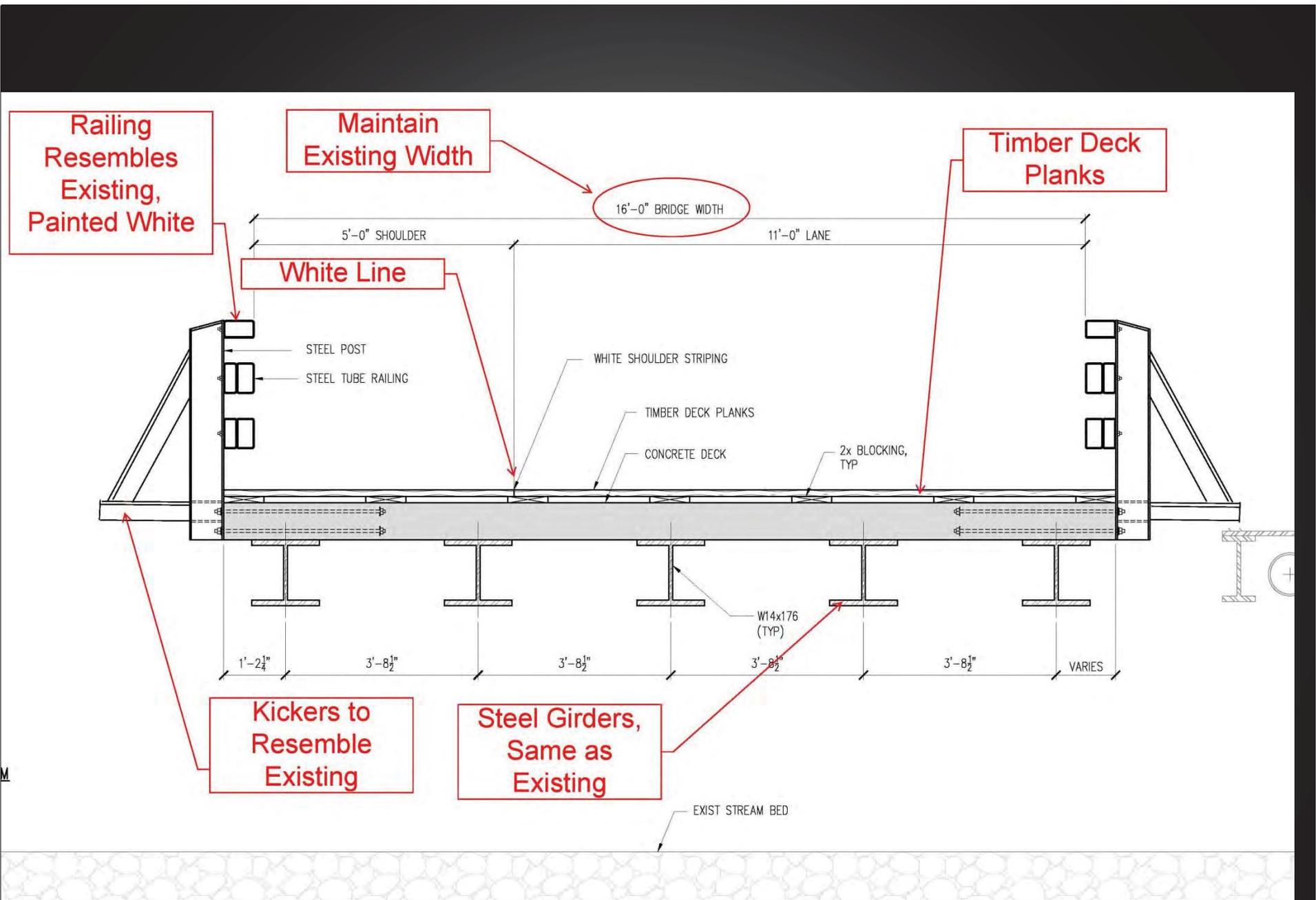
Comments

- Wood deck is the preferred material to have the feel and sound of the wood bridge
- Note that frp was designed for Wainiha
- Steel railings are less bulky than the wood railings and are thus preferable
- It was noted that this bridge, more than the other two bridges is a community resource as the stream is heavily used for recreational activities
- It was also noted that City, with State and FHWA may still pursue the concrete deck as it may be the most feasible and prudent alternative











Photographs:

Submit clear and descriptive photographs. The size of each image must be 1600x1200 pixels at 300 ppi (pixels per inch) or larger. Key all photographs to the sketch map.

Name of Property: Kapahi Bridge

City or Vicinity: Kapaa

County: Kauai State: Hawaii

Photographer: Michael Hunneman

Date Photographed: May 14, 2010

Description of Photograph(s) and number: West approach to the bridge

1 of _6_.



Name of Property

County and State

Name of Property: Kapahi Bridge

City or Vicinity: Kapaa

County: Kauai State: Hawaii

Photographer: Michael Hunneman

Date Photographed: May 14, 2010

Description of Photograph(s) and number: Downstream elevation

2 of _6_.



Name of Property

County and State

Name of Property: Kapahi Bridge

City or Vicinity: Kapaa

County: Kauai State: Hawaii

Photographer: Michael Hunneman

Date Photographed: May 14, 2010

Description of Photograph(s) and number: Abutment and steel stringers

3 of _6_.



Name of Property

County and State

Name of Property: Kapahi Bridge

City or Vicinity: Kapaa

County: Kauai State: Hawaii

Photographer: Michael Hunneman

Date Photographed: May 14, 2010

Description of Photograph(s) and number: Deck and railings

4 of _6_.



Name of Property

County and State

Name of Property: Kapahi Bridge

City or Vicinity: Kapaa

County: Kauai State: Hawaii

Photographer: Michael Hunneman

Date Photographed: May 14, 2010

Description of Photograph(s) and number: Upstream elevation

5 of _6_.



Name of Property

County and State

Name of Property: Kapahi Bridge

City or Vicinity: Kapaa

County: Kauai State: Hawaii

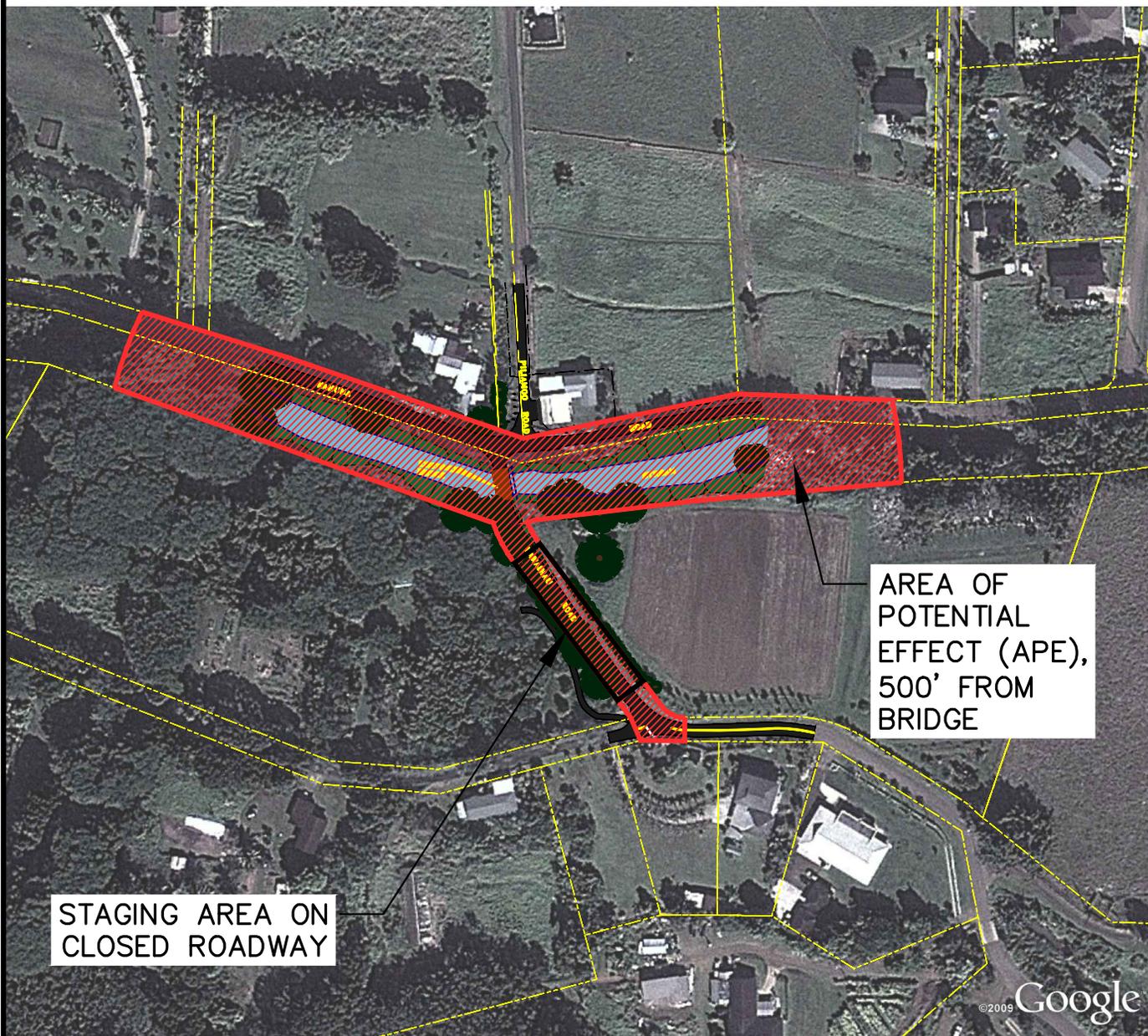
Photographer: Kuppusamy Venkatesan

Date Photographed: March 09, 2012

Description of Photograph(s) and number: Bridge damage from flood of March, 2012

6 of _6_.





STAGING AREA ON
CLOSED ROADWAY

AREA OF
POTENTIAL
EFFECT (APE),
500' FROM
BRIDGE

LEGEND



AREA OF POTENTIAL EFFECT
(APE), 500' FROM BRIDGE



SCALE: 1" = 200'

CREATED: 9/17/2013
CREATED BY:
REVISED:

SOURCES:

**KAPAHI STREAM BRIDGE
AREA OF POTENTIAL EFFECT**

SCALE: 1" = 200'



EXHIBIT

1



AKINAKA & ASSOCIATES, LTD.

3375 Koapaka Street, Suite B-206

Honolulu, Hawaii 96819-1947

Phone: (808)836-1900 Fax No: (808)836-8852

Meeting notes

A&A JOB NO.: KAI10-03, KAI10-04 & KAI11-02

PROJECT: Rehabilitation/Replacement of the Opaekaa, Puuopae and Kapahi Bridges

DATE/TIME: December 7, 2011 – 5:30 pm

LOCATION: Wailua Homestead Park, Kamalu Rd, Kapaa, HI 96746

SUBJECT: Community Meeting #1

DISCUSSION ITEMS:

PRIOR TO START OF MEETING

- Attendee requested Project Team (PT) explain to audience why community meetings are required.
- Attendee requested PM talk about historic significance of bridge.

START OF MEETING

- PT presented power point presentation
 - o Explained PT conducting community meeting for the following reasons:
 - As part of process required to receive federal funding.
 - To receive community concerns/suggestions related to project.
 - o Brief history of bridge
 - Year constructed - 1937
 - Year renovated – 1977
 - Bridge materials – Steel girders and timber deck planking
 - o Pictures of structural deficiencies observed on bridge members.
- Community questions, comments and suggestions
 - o Attendee asked whether bridge girders are part of original construction
 - PT unsure whether girders renovated as part of 1977 work.
 - Attendee stated that if girders replaced as part of 1977 renovation, then bridge may not be considered historic.
 - PT added that according to residences located near the bridge, the original girders remained and deck was replaced.
 - Attendee stated that bridge decks are typically not considered historic since routine maintenance often repaves bridge decks.

- Attendee asked what the bridge's current load rating is and whether structural reports were conducted to determine load ratings.
 - PT stated current load rating is 5 tons
 - PT explained reports conducted in 2007 and 2009 as part of required bridge inspections every two years.
- Attendee asked whether bridge load rating decreased due to corrosion.
 - PT stated that load rating was 7.5 tons in 1990 and decreased to 5 tons in 1998.
- Attendee asked what type of construction would be needed to allow heavier loads to cross the bridge and whether new construction would include 2 lanes.
 - PT explained that these questions are part of PT's next step and current meeting is intended to gather community comments and/or suggestions.
- Attendee stated he has no opinion on whether bridge is one lane or two lane but improved bridge should be able to support emergency vehicles, school buses, etc.
- Attendee explained that bridge has history of being closed during floods and asked what is being considered to fix the problem, such as elevating the bridge or building bridge to withstand flooding.
 - PT explained that all reasonable options will be considered.
- Attendee asked who will make the final decision on bridge layout.
 - PT explained that federal, state, and county will all be involved.
- Attendee questioned how much weight community input will play since federal government would fund 80% of project.
 - PT explained that the community meeting process is a requirement set by the federal government to obtain funding and therefore federal government is very interested in community input.
- Attendees had detailed discussion explaining their understanding of the 106 process and the communities' voice in history and rural characteristics.
 - PT did not comment on discussion between attendees.
- Attendee questioned whether federal government would fund construction of a one lane bridge because previous project was not funded since design was for a one bridge.
 - PT explained that acceptance of one lane bridge will be discussed with the federal government.
 - Another attendee stated that federal government has made a lot of progress toward accepting one lane bridges since last project. Also, mentioned other one lane bridges on Kauai that have been federally funded.
- Attendee asked whether existing bridge is being considered for replacement or reconstruction and if so, he would like to see something other than "a hunk of concrete".
 - PT stated that replacement will be considered as well as multiple bridge materials and designs.
- Attendee quoted statistics regarding one lane bridges having three times more accidents than two lane bridges. Also quoted statistic regarding amount of accidents on project bridge.
 - Another attendee questioned the statistics and requested PT provides statistics on amount of accidents recorded on project bridge.
 - Attendee emphasized that she would like a statistic of accidents actually on the bridge and not a statistic based on a length of road segment.
 - PT acknowledged request.

- Attendee stated that one lane bridges have been identified in county general plan to have important values to community and bridge should keep with rural scale and rural neighborhoods.
- Attendee questioned why Opeakaa, Puuopea and Kapahi bridges chosen and not other bridges in the area whose alignments, in his opinion, are more dangerous.
 - PT explained that the bridge selected for the project has been determined to be structural deficient, whereas other bridges mentioned by attendee have been determined to be functionally deficient. PT then explained that structurally deficient bridges have priority over functionally deficient.
- Attendee questioned why bridge has not been maintained since inspections are done every two years and therefore county would have been aware of its condition.
 - PT acknowledged concern but did not comment on county maintenance.
- Attendee asked whether bridge needs to be on historic registry to be considered historic.
 - PT explained that since the bridge is over 50 years old, its historic significance needs to be explored even if not registered.
- Attendee asked why the county does not just paint the bridge.
 - PT explained that the corrosion to the bridge is too extensive to be fixed by painting.
- Attendee asked if more than one option will be presented to the community.
 - PT explained that multiple options will be presented.
- Attendee asked if PT could inform community if bridge is eligible to be registered as historic at next meeting. Attendee also requested PT share more history of bridge with community at next meeting.
 - PT acknowledged request.
- Attendee asked whether PT will consult with State Historic Preservation Division (SHPD) and/or Kauai Historic Preservation Review Committee (KHPRC) before second community meeting.
 - PT stated that they plan to and are currently trying to get on their agenda.
- Attendee asked when Draft Environmental Assessment (EA) would be published.
 - PT explained current schedule predicts around 3 months however it is dependent on progress of community meetings.
- Attendee asked to clarify whether historical consultant on project team worked for an architecture firm or a structural firm.
 - PT explained that she worked for an architecture firm.
 - Attendee stated that previous project had a historical expert with a background in structural engineering and questioned whether current PT will have someone with these credentials.
 - PT explained that separate consultants are on PT for structural and historical considerations.
 - Another attendee stated that historical consultant on PT had previously worked for SHPD for over 10 years and feels she is very qualified. He also mentioned that SHPD typically uses architects.

END OF MEETING

Meeting notes

PROJECT: Rehabilitation/Replacement of the Opaekaa, Puuopae and Kapahi Bridges

DATE/TIME: December 8, 2011 – 3:30 pm (Kapahi Bridge on agenda only)

LOCATION: Kapaa Middle School Cafeteria

SUBJECT: Community Meeting #1

DISCUSSION ITEMS:

PRIOR TO START OF MEETING

- Attendee requested Project Team (PT) explain to audience why community meetings are required.
- Attendee requested PM talk about historic significance of bridge.

START OF MEETING

- PT presented power point presentation
 - o Explained PT conducting community meeting for the following reasons:
 - As part of process required to receive federal funding.
 - To receive community concerns/suggestions related to project.
 - o Brief history of bridge
 - Year constructed - 1937
 - Year renovated – 1977
 - Bridge materials – Steel girders and timber deck planking
 - o Pictures of structural deficiencies observed on bridge members.
- Community questions, comments and suggestions
 - o Attendee asked whether bridge girders are part of original construction
 - PT unsure whether girders renovated as part of 1977 work.
 - Attendee stated that if girders replaced as part of 1977 renovation, then bridge may not be considered historic.
 - PT added that according to residences located near the bridge, the original girders remained and deck was replaced.
 - Attendee stated that bridge decks are typically not considered historic since routine maintenance often repaves bridge decks.
 - o Attendee asked what the bridge's current load rating is and whether structural reports were conducted to determine load ratings.
 - PT stated current load rating is 5 tons
 - PT explained reports conducted in 2007 and 2009 as part of required bridge inspections every two years.
 - o Attendee asked whether bridge load rating decreased due to corrosion.
 - PT stated that load rating was 7.5 tons in 1990 and decreased to 5 tons in 1998.

- Attendee asked what type of construction would be needed to allow heavier loads to cross the bridge and whether new construction would include 2 lanes.
 - PT explained that these questions are part of PT's next step and current meeting is intended to gather community comments and/or suggestions.
- Attendee stated he has no opinion on whether bridge is one lane or two lane but improved bridge should be able to support emergency vehicles, school buses, etc.
- Attendee explained that bridge has history of being closed during floods and asked what is being considered to fix the problem, such as elevating the bridge or building bridge to withstand flooding.
 - PT explained that all reasonable options will be considered.
- Attendee asked who will make the final decision on bridge layout.
 - PT explained that federal, state, and county will all be involved.
- Attendee questioned how much weight community input will play since federal government would fund 80% of project.
 - PT explained that the community meeting process is a requirement set by the federal government to obtain funding and therefore federal government is very interested in community input.
- Attendees had detailed discussion explaining their understanding of the 106 process and the communities' voice in history and rural characteristics.
 - PT did not comment on discussion between attendees.
- Attendee questioned whether federal government would fund construction of a one lane bridge because previous project was not funded since design was for a one bridge.
 - PT explained that acceptance of one lane bridge will be discussed with the federal government.
 - Another attendee stated that federal government has made a lot of progress toward accepting one lane bridges since last project. Also, mentioned other one lane bridges on Kauai that have been federally funded.
- Attendee asked whether existing bridge is being considered for replacement or reconstruction and if so, he would like to see something other than "a hunk of concrete".
 - PT stated that replacement will be considered as well as multiple bridge materials and designs.
- Attendee quoted statistics regarding one lane bridges having three times more accidents than two lane bridges. Also quoted statistic regarding amount of accidents on project bridge.
 - Another attendee questioned the statistics and requested PT provides statistics on amount of accidents recorded on project bridge.
 - Attendee emphasized that she would like a statistic of accidents actually on the bridge and not a statistic based on a length of road segment.
 - PT acknowledged request.
- Attendee stated that one lane bridges have been identified in county general plan to have important values to community and bridge should keep with rural scale and rural neighborhoods.
- Attendee questioned why Opeakaa, Puuopea and Kapahi bridges chosen and not other bridges in the area whose alignments, in his opinion, are more dangerous.
 - PT explained that the bridge selected for the project has been determined to be structural deficient, whereas other bridges mentioned by attendee have

- been determined to be functionally deficient. PT then explained that structurally deficient bridges have priority over functionally deficient.
- Attendee questioned why bridge has not been maintained since inspections are done every two years and therefore county would have been aware of its condition.
 - PT acknowledged concern but did not comment on county maintenance.
 - Attendee asked whether bridge needs to be on historic registry to be considered historic.
 - PT explained that since the bridge is over 50 years old, its historic significance needs to be explored even if not registered.
 - Attendee asked why the county does not just paint the bridge.
 - PT explained that the corrosion to the bridge is too extensive to be fixed by painting.
 - Attendee asked if more than one option will be presented to the community.
 - PT explained that multiple options will be presented.
 - Attendee asked if PT could inform community if bridge is eligible to be registered as historic at next meeting. Attendee also requested PT share more history of bridge with community at next meeting.
 - PT acknowledged request.
 - Attendee asked whether PT will consult with State Historic Preservation Division (SHPD) and/or Kauai Historic Preservation Review Committee (KHPRC) before second community meeting.
 - PT stated that they plan to and are currently trying to get on their agenda.
 - Attendee asked when Draft Environmental Assessment (EA) would be published.
 - PT explained current schedule predicts around 3 months however it is dependent on progress of community meetings.
 - Attendee asked to clarify whether historical consultant on project team worked for an architecture firm or a structural firm.
 - PT explained that she worked for an architecture firm.
 - Attendee stated that previous project had a historical expert with a background in structural engineering and questioned whether current PT will have someone with these credentials.
 - PT explained that separate consultants are on PT for structural and historical considerations.
 - Another attendee stated that historical consultant on PT had previously worked for SHPD for over 10 years and feels she is very qualified. He also mentioned that SHPD typically uses architects.

END OF MEETING



AKINAKA & ASSOCIATES, LTD.

3375 Koapaka Street, Suite B-206
Honolulu, Hawaii 96819-1947
Phone: (808)836-1900 Fax No: (808)836-8852

Meeting notes

A&A JOB NO.: KAI10-03, KAI10-04 & KAI11-02

PROJECT: Rehabilitation/Replacement of the Opaekaa, Puuopae and Kapahi Bridges

DATE/TIME: April 11, 2012 – 3:30 pm

LOCATION: Kapaa Middle School Cafeteria

SUBJECT: Community Meeting #2

REFERENCES: *Puuopae Bridge Replacement/Rehabilitation Opaekaa Bridge Replacement
Community Meeting Agenda, Sign-In Sheet*

DISCUSSION ITEMS:

1. Project Team Presentation
 - A. 3:30pm – Allan Smith
 - i. Called meeting to order
 - ii. Introduction of project and describe the meeting agenda
 - B. 3:35pm – Tonia Moy
 - i. Section 106
 - C. 3:43pm – Ron Terry
 - i. Early Consultation Letter
 - D. 3:44pm – Michael Dega
 - i. Opaekaa Bridge History
 - E. 3:48pm – Tonia Moy
 - i. Opaekaa Bridge key architectural features
 - F. 3:50pm – Mike Hunnemann
 - i. Opaekaa Bridge design options
 - G. 3:59pm – Michael Dega
 - i. Puuopae Bridge History
 - H. 4:02pm – Tonia Moy
 - i. Puuopae Bridge key architectural features
 - I. 4:03pm – Mike Hunnemann
 - i. Puuopae Bridge design options
 - J. 4:07pm – Michael Dega
 - i. Kapahi Bridge History
 - K. 4:09pm – Tonia Moy
 - i. Kapahi Bridge key architectural features
 - L. 4:13pm – Mike Hunnemann
 - i. Kapahi Bridge design options

2. Comments and suggestions from community
 - A. Jack Baird had concern about the multiple supports and floating debris damaging new bridges.
 - i. Asked if Project Team worried about extreme high water flows and whether deck will be raised so a 300 year event will flow under it, including trees that will carried with that event.
 - a. Mike Hunnemann answered and addressed all three bridges, explained that West Consultants will be determining the 100 year high water mark for all three bridges.
 - b. Also explained that due to the close vicinity of Kapahi Bridge to Kahuna Road, the bridge cannot be raised without extensive measures, so the bridge will be designed to withstand flooding.
 - c. For Opaekaa and Puuopae, after obtaining results of the hydraulic study, if the bridges are within that high water mark and there is the ability to raise the deck it will be considered.
 - B. Ken Taylor asked whether load rating will be the same for both one lane and two lanes.
 - i. Mike Hunnemann verified, yes.
 - a. Resident had concern about option of parallel bridge because existing bridge already has a lack of maintenance and adding a second bridge would require additional maintenance.
 - b. Resident recommends only having one bridge.
 - C. Carol Beardmore would like to retain as much of the original bridge as possible and would like 1-lane bridges, believes one-lane bridge has traffic calming effect.
 - i. Feels one-lane bridge fits the character of the community.
 - ii. Stated that cars speed down toward Puuopae Bridge and the narrow bridge slows them down. She feels a two-lane bridge will allow cars to speed through faster.
 - iii. Stated that people are really good about being courteous about stopping and allowing cars and people to cross safely.
 - iv. Keep the country, country.
 - D. Phil Tacbian concern is for safety and the safety of the people using the bridge.
 - i. Recommends two lane bridges because feels it is safer.
 - ii. Also states he is for replacing the bridges.
 - iii. His family has lived here for four generations and still has four generations residing here.
 - E. Marge Freeman would like 1 lane bridge and believes accident data is inaccurate because some of the data taken is from accidents 2 miles away from the bridge.
 - i. Mentioned she walks over the bridges and walks down the middle so cars will see her. She said she has never had a problem.
 - F. Lou Nishida Jr. stated that he was 5th generation and would like two lane bridge. He appreciates the historic aspect but feels that preserving it as-is compromises safety. County can put in speed humps for traffic calming.
 - G. Jeff Weiss from the Fire Department asked to clarify that all options will raise the load rating so that fire trucks can cross.
 - i. Mike Hunnemann confirmed, yes.
 - a. Follow-up, attendee stated that that was his only concern.
 - H. Tommy Noyes works for DOH and encourages people to be more active by walking and biking and states that vehicle speeds are primary factor in automobile pedestrian fatality and the slower the vehicle is traveling the lower the likelihood of a fatality.
 - i. Believes 1 lane bridge is natural traffic calming and slows vehicle speeds and therefore safer.

- ii. Agrees with bridges being able to carry emergency vehicles and maintain historical integrity.
- I. James Aiu feels that 1-lane bridges cause problems because some people do not know it is 1-lane and try to cross at the same time. Mentioned that he has had to stop and reverse off the bridge on a couple of occasions.
- J. Katherine Musik in favor of recycling parts.
 - i. Will concrete rail be high? Attendee likes to look over bridge when crossing.
 - a. Mike explained that rails do not need to be replaced with concrete railings, they can be replaced with metal railings. If they were concrete they would be 2 to 2.5' high and have arch openings.
- K. Kip Goodwin likes Option 2 for Opaekaa and Option 1 for Puuopae.
 - i. In favor of 1-lane bridge.
- L. Jack Baird suggested that any exposed or concrete encased steel be galvanized?
 - i. Mike Hunnemann confirmed, yes all steel will be galvanized.
- M. Ray Carpenter feels Puuopae should be two lanes because Kalama Road is higher and sight distance is a problem
 - i. Bridge should be raised to be same eye level as cars coming off Kalama Road.
 - ii. Opaekaa should be Option 2 and stay 1-lane.
 - iii. Likes Option 1 for Kapahi, 1-lane.
- N. Mark Marshall, civil defense administrator, would like something done about safety.
 - i. Concern for personal safety and families' safety and would like to know that emergency vehicles can get to him.
 - ii. States traffic calming, rural character and visual aesthetics are important to him but should be weighed along with safety.
 - iii. States school buses must take a 3 mile detour.
 - iv. People speed over 1-lane bridges and they no longer serve their function.
 - v. He is local farmer and has looked at alternative routes in the event these bridges close, stated that it would cost him millions of dollars if bridge closed.
 - vi. Traffic calming is an enforcement problem and can be handled in ways other than 1-lane bridges.
 - vii. Supports 2-lane bridges.
 - viii. Does not feel Kapahi should be relocated.
- O. Marge was concerned that the bridge girders are in the water.
 - i. Mike Hunnemann clarified that the girders are above the water level.
- P. Attendee asked that others not blame two-lane bridges for concerns of speed and safety.
- Q. Randy Blake stated that traffic calming is something that engineers design into the roadway to slow traffic down.
 - i. Mentioned County does not maintain existing bridges.
 - ii. Regardless of posted speed limit, people will drive faster on wider roads.
 - iii. Believes bridges should be able to carry emergency vehicles and school buses.
 - iv. Asked why the Kapahi offset intersection needs to be addressed.
 - v. Likes character of Kapahi wooden deck and opposed to concrete.
- R. Ken Taylor felt that realigning Kapahi did not make sense due to the limited amount of residences and limited potential for expansion.
- S. Pat Griffin stated that the offset intersection at Kapahi is with a private driveway and asked why should the road be realigned to benefit a private entity?
 - i. Presented accident statistics that she stated was from the Police department and listed several locations that were far away from the bridges.
 - ii. Regarding sight distance at Puuopae and Kipapa, when the Hau trees are maintained you can see just fine.

- iii. Stated that safety and historic preservation are important and recommends keeping bridges and replacing Puuopae guardrails with wood, steel backed rails.
 - T. Lou Nishida explained that in the past the 1-lane bridge served its function because you would rarely need to stop for oncoming traffic, however due to increase in traffic, he now must yield almost every time he crosses.
 - i. When the Kapaa Bypass road is closed, the traffic is worse.
 - ii. Recommends two-lane bridge.
 - U. Attendee stated that since aesthetics is great concern perhaps adding timber over modern supports would be a good option.
 - V. Keith Blake seconds Pat Griffin
 - i. Loves all of the bridges and enjoys driving over both Opeakaa and Puuopae bridge.
 - ii. Feels Opeakaa is one of most unique bridges on Kauai and entire state, not only for historic value but also artistic feel.
 - iii. In favor of rebuilding bridge, every nut and bolt, and rebuilding will allow history and warmth to be preserved for future generations.
 - iv. Feels Puuopae should be “beefed” up for emergency vehicles and the guardrails should be replaced.
 - v. Questions necessity of upgrading Kapahi because Kahuna road is already served by a large 4 lane bridge that is out of character for the area. That bridge should be able to carry a fire truck.
 - vi. Asked why only focusing on these three bridges? Mentioned that at least two other bridges in the area have been left off and should be talked about.
 - a. Mike Hunnemann explained that safety is related to strength and each bridge in State have a sufficiency and load rating and based on these factors is why these three bridges are being discussed.
 - vii. Questions necessity of sideway on bridges when approaches have no sidewalks.
 - a. Attendee opinion is that bridges should not have sidewalks.
 - W. Attendee pointed out that pedestrians are not necessarily safer on the bridge because of sidewalks since the approaches do not have wide shoulders or sidewalks and already shares the travel lane with vehicles.
 - i. In favor of no sidewalks.
 - X. Sally (last name unknown), 37 year resident, in favor of 1-lane without sidewalks and preserve as many historic elements as possible.
 - Y. Mark Marshall, pointed out that ambulance exceeds 5 ton rating.
 - Z. Helen Yahner, in favor of 1-lane bridges for reasons stated and to preserve sense of history and sense of place.
 - AA. Carol Beardmore feels sidewalks not necessary and in favor of 1-lane.
 - BB. Randy Blake sees no point in building sidewalks on these bridges and would rather see tax dollars spend to build pathways in other areas.
 - CC. Jack would like to emphasis that County needs to maintain the bridges because they would not be in these problem if they maintained them.

3. End of Meeting.



AKINAKA & ASSOCIATES, LTD.

3375 Koapaka Street, Suite B-206
Honolulu, Hawaii 96819-1947
Phone: (808)836-1900 Fax No: (808)836-8852

Meeting notes

A&A JOB NO.: KAI10-03, KAI10-04 & KAI11-02

PROJECT: Rehabilitation/Replacement of the Opaekaa, Puuopae and Kapahi Bridges

DATE/TIME: April 11, 2012 – 6:30 pm

LOCATION: Kapaa Middle School Cafeteria

SUBJECT: Community Meeting #2

REFERENCES: *Puuopae Bridge Replacement/Rehabilitation Opaekaa Bridge Replacement Community Meeting Agenda, Sign-In Sheet, Email dated Dec. 30, 2011 from Alvin Takeshita, Email dated April 28, 2004 from Alvin Takeshita, Email dated October 18, 2004 from KC Lum, Traffic Collisions table provided by Pat Griffin.*

DISCUSSION ITEMS:

1. Project Team Presentation
 - A. 6:30pm – Allan Smith
 - i. Called meeting to order
 - ii. Introduction of project and describe the meeting agenda
 - B. 6:34pm – Tonia Moy
 - i. Section 106
 - C. 6:40pm – Ron Terry
 - i. Early Consultation Letter
 - D. 6:41pm – Michael Dega
 - i. Opaekaa Bridge History
 - E. 6:45pm – Tonia Moy
 - i. Opaekaa Bridge key architectural features
 - F. 6:47pm – Mike Hunnemann
 - i. Opaekaa Bridge design options
 - G. 6:56pm – Michael Dega
 - i. Puuopae Bridge History
 - H. 6:59pm – Tonia Moy
 - i. Puuopae Bridge key architectural features
 - I. 7:00pm – Mike Hunnemann
 - i. Puuopae Bridge design options
 - J. 7:05pm – Michael Dega
 - i. Kapahi Bridge History
 - K. 7:07pm – Tonia Moy
 - i. Kapahi Bridge key architectural features
 - L. 7:08pm – Mike Hunnemann
 - i. Kapahi Bridge design options

2. 7:12pm - Comments and suggestions from community
 - A. Gail Stevens asked whether histories of accident rates on the bridges are available.
 - i. Mike explained that there are various reports available but they are not specific enough to say exactly how many occurred on each bridge.
 - ii. Attendee's main concern is safety and prefers 1-lane bridges for all.
 - B. Sharry Glass stated that she is a homeowner on Puuopae Place since 1985, she has been walking the streets since then and is very opposed to a 2-lane bridge. She stated that she was under the impression that when something is put on the historic register, it will be preserved "as is" and if reconstructed it would be exactly the same.
 - i. She mentioned that it is obvious from damage that the bridges have not been preserved or maintained.
 - ii. Attendee expressed concern that existing bridges have not been maintained so if the bridge is changed, attendee asked whether new bridge will be maintained.
 - iii. Attendee would also like bike, pedestrian and horse path because there are many joggers and riders.
 - C. Glenn Mickens read email correspondences, see attachments.
 - i. Emphasized that his main concern is safety.
 - ii. Strong proponent for 2-lane bridges over 1-lane bridges.
 - iii. Mentioned previous projects from 2004 that were approximately 80% complete when the project was stopped.
 - iv. He emphasized that the delays are costing the community more money.
 - v. He states that historical importance should never trump safety.
 - vi. He stated that email indicates that 1-lane bridges have 2 times more accidents than 2-lane bridges.
 - vii. Per email, he states that 50% of 1-lane bridge accidents occur on Hanalei Bridge.
 - D. Emery Griffin-Noyes expressed that Puuopae Bridge played a major role in his childhood and early memories.
 - i. He played and rode his bike on Puuopae Bridge and was able to do so because of the 1-lane bridge and lifestyle it provides.
 - ii. In favor of preserving bridges as much as possible.
 - iii. Believes 1-lane bridges make people slow down.
 - E. Bill Chamberlain pointed out that traffic over Hanalei Bridge is much higher than these rural bridges.
 - i. Bill asked whether there is a traffic study that would justify 2-lanes. He has lived here for a long time and has never had to wait for more than one car. Will the County factor in the additional cost of a two-lane bridge as related to the extra value that it will give in terms of traffic?
 - a. Project Team stated that they do not have any at this time.
 - F. Nancy Budd asked to clarify that she was also part of the committee that Glenn Mickens referred to and stated that most people wanted a 1-lane bridge.
 - i. Attendee stated that at Puuopae Bridge people drive nice and the 1-lane bridge acts as a traffic calmer.
 - ii. Prefers 1-lane bridge and preserving history as much as possible.
 - iii. Attendee also noted that she could not tell what the proposed rails would look like from the sketches of the options.
 - G. Nancy Budd stated that she part of the 2004 effort and mentioned she has meeting minutes from that time and stated that 1-lane bridges were desired almost unanimously by a show of hands. About 90 people were present. TM: F & G are the same person and saying the same thing?

- i. Stated that people slow down and drive nice at Puuopae Bridge and she feels it is traffic calming.
 - ii. Preference is to maintain existing bridge to honor cultural history.
 - iii. Feels 1-lane bridges provide the community with a specific feel.
 - iv. Opposed to ugly metal bridges and would like designs to reflect history.
- H. Lauren Calhoun stated that she wanted to piggy back off Emery's comment and that the bridges were a part of her childhood and collective memory.
 - i. She stated she went away for college and chose to come back to be part of the community.
 - ii. Attendee prefers preserving history and cultural integrity.
- I. Sally Armstrong stated that she lived in the area for over 25 years on Kalama Road and hears drag racing. She is convinced that if the bridges are 2-lanes people will drive faster and put everyone in jeopardy.
 - i. Prefers 1-lane for safety.
- J. Tommy Noyes stated that he works for DOH and promotes walking and biking. He stated that studies show that vehicle speeds are directly related to pedestrian safety. According to attendee at 20mphs chances of survival are good, at 30mph it is worse and at 40mph is almost always fatal. He feels 1-lane bridges have a traffic calming effect which is safer for pedestrians.
 - i. Attendee clarified that he is in favor of 1-lane for safety.
 - ii. In favor of preserving cultural integrity.
 - iii. Advises against sidewalk on bridges because it will make the bridge appear wider and in return increase vehicle speeds. Also no sidewalks or shoulders are available leading up to bridge.
- K. Andy Bushnell stated that they keep coming to these community meetings regarding these bridges and always say they want 1-lane but the County does not maintain so they have to do it over and over.
 - i. Attendee stated he has been driving the roads for over 40 years and that people always stop at the bridges and say hello and talk story.
 - ii. Stated he has never seen an accident on the bridge.
 - iii. Attendee feels bridges are historically valuable.
- L. Pat Griffin asked to respond to Glenn's statements and stated that in 2004 86 of 90 voted for 1-lane and a total of 4 people were selected for committee he spoke about, one being herself.
 - i. Attendee presented figures from the Kauai police department of accident reports between March 2007 and March 2012, see attachment.
 - a. Attendee stated that several accidents listed occurred a mile or more way from the bridge. She stated that there is not enough data to say whether it is a bridge problem.
 - b. According to her research, there has only been one fatality in the homestead and it was not on the bridge.
 - c. Bridges should stay historic and 1-lane.
- M. Robby Abrew asked if weight limit increase will allow commercial vehicles to cross and result in more commercial vehicle traffic through the neighborhood.
 - i. Mike responded that the bridge will designed to carry the load of any legal vehicle on the road.
 - a. Robby asked if the bridge can have restrictions to prevent commercial vehicles from traveling through neighborhood.
 - (1) Project Team stated that this would need to be discussed with the County.
- N. Rayne Regush stated that safety is important and encourages the consultants to do research on accidents and to be specific to accidents on the bridge and not general vicinity.

- O. Michael Fernandes stated that his family has been ranching for over 100 years and bridges are critical to cattle operations.
 - i. He stated that he sees the significance of history but feels bridge should be 2-lanes so he can get his farm equipment over. He stated that times changed and equipment has changed and the bridges need to change to accommodate.
 - ii. He stated that he sees a lot of road rage, at least once every month or every two week.
 - iii. He stated that in 1971 a group of high school kids missed the “Yasutaki” (as known locally) Bridge which resulted in 2 of the 3 dying.
 - iv. He stated the bridges may have been adequate in the past but bridges should now be 2-lanes while keeping as historic as possible.
 - v. 1-lane bridge does not serve the ranchers and farmers.
- P. Attendee asked what the bridge widths are now and what the new bridges will be.
 - i. Mike stated the widths of the existing bridges and the new bridge will depend on whether 1-lane or 2-lane is constructed. Mike clarified that a standard lane is 12’ wide.
 - a. Attendee stated he has no opinion on sidewalks.
- Q. Kelly Rice Hudson stated that she would like to keep the bridges as close as possible to existing.
 - i. Kelly asked to clarify if all options are concrete but would like Kapahi to be wood.
 - a. Mike clarified that all the options presented were concrete.
- R. Bob Farias explained that he lived near Kapahi Bridge for past 40 years and the single lane is a problem because if you are on the bridge from Kawaihau Road and another car is on Kahuna Road, there is no place to pull over to allow cars to pass since the approach roadways are also only 1-lane.
 - i. Attendee feels the bridge should not be 2-lanes unless the approaches are widened.
 - ii. Attendee stated that approaches should have pull-offs for passing.
 - iii. Most important part of bridges is weight limits, if they remain 1-lane he would like the weight limit increased.
 - iv. Feels Kapahi Bridge could stay “as is” because of another new bridge constructed on Kahuna Road.
 - v. Building a new bridge will be difficult because of all the existing water pipes.
- S. Rayne Regush stated that she is disappointed with the County’s press release because it does not mention that the bridges are historic.
 - i. Rayne suggested the project team speak to a specific resident, Joe Preige regarding the history of the bridges.
- T. Lelan Nishek stated that he looks at Puuopae Bridge and sees nothing historic about it.
 - i. Does not care if 1-lane or 2-lane but cares about the wasted money from 2004.
 - ii. Attendee stated that the buses let kids off before the bridges and it is not safe.
 - iii. Emphasized that something should be done soon.
 - iv. Attendee mentioned that the County should be attendance to hear the community comments.
 - a. Mike confirmed that two County officials are present in the audience.
- U. Gary Hudson stated that safety is number 1 and is in favor of keeping bridge how they are without sidewalk.
 - i. Attendee questioned how the truss can be repaired for use in Opaekaa’s option 2.
 - a. Mike clarified that some materials will need to be replaced but the truss will no longer be a structural member and will be only visual.
- V. Gail Stevens stated that she has crossed Puuopae Bridge for 25 years, all conditions and all times of day and she has never seen road rage.
- W. Sharry Glass noted that based on Glenn’s emails, 50% of 1-lane bridge accidents occur on Hanalei Bridge and 1-lane bridges have 2 times more accidents than 2-lane bridges, so if you eliminate the Hanalei accidents, 1-lane vs 2-lane accidents are essentially even.

- i. Attendee stated that the road leading to Puuopae bridge is steep and people slow down because of the 1-lane bridge and that won't happen with two lanes.
 - ii. Mentioned the farmer's statement regarding 2-lanes, she wanted to clarify that 1-lane or 2-lane will allow his farm equipment to cross.
 - X. Pat Griffin clarified that every option, regardless of 1-lane or 2-lane, will carry 36 tons.
 - i. Mike clarified that it will be strong enough to carry any legal vehicle.
 - Y. Michael Fernandes would like bike or horse lane and disagrees that 1-lane bridges are safer.
 - i. Feels 1-lane bridge is not a consensus and states he has talked with many people in favor of 2-lanes
 - Z. Attendee asked how long after this information gathering will anything will happen.
 - i. Mike stated that money is available for two of the bridges.
 - AA. Pat Phung from FHWA addressed the community and explained the process they are participating in.
 - BB. Attendee asked if anyone knows what the original rails for Puuopae look like.
 - i. Tonia clarified that based on nomination for the Historical register, it was once a truss but in 1958 it was changed to a wood railing girder system.
 - a. Attendee asked whether the design will reflect their history with wood rails or truss.
 - (1) Tonia asked Emery Griffin if he remembered what railing was in place when he was a child.
 - (A) Emery did not recall.
 - CC. Nancy Budd suggested a compromise and placing pedestrian and bike path on outside of bridge.
 - DD. Nancy Budd stated that it was unfortunate that the 2004 plans were never built but she stated the design was 32' wide and she feels the community can now move forward with something that fits the community.
 - i. Attendee stated that she feels safer on a single lane bridge.
 - ii. Attendee stated that the Puuopae bridge approaches need more work.
 - EE. Lelan Nishek mentioned that part of road shoulder of Puuopae road washed away and the County had fixed it by placing gravel. He feels the shoulder needs to be stabilized.
 - FF. Glenn Mickens repeated portions of his previously read email and emphasized portions that stated the accident data represents those only on the bridge.
 - i. Attendee asked for estimate on how long before bridge is constructed.
 - a. Project Team stated that it is too premature provide an estimate.
 - ii. Attendee suggested use of ACRO Bridge because it would be much cheaper.
 - a. Project Team acknowledged suggestion.
 - GG. Gina Caliendo stated she is for 1-lane, no pedestrian path and remain historic.
 - HH. Attendee asked whether money is allocated for maintenance.
 - i. Mike explained that design and construction of these bridges are different funding sources than maintenance. Maintenance will depend on the County.
 - II. Attendee stated that based on the age of the bridges, they must have been built well to last so long.
 - JJ. Eve Salomon asked to take a hand vote.
 - i. Project Team asked not do so and that all the comments are noted and will considered.
 - ii. She stated she wants 1-lane.
 - KK. Michael Fernandez stated that he has concerns that all the options have steel and steel maintenance is a nightmare.
 - i. Mike Hunnemann clarified that all steel will be galvanized.
3. End of Meeting.



AKINAKA & ASSOCIATES, LTD.

3375 Koapaka Street, Suite B-206
Honolulu, Hawaii 96819-1947
Phone: (808)836-1900 Fax No: (808)836-8852

MEETING NOTES

A&A JOB NO.: KAI10-03, KAI10-04 & KAI11-02
PROJECT: Rehabilitation/Replacement of the Opaekaa, Puuopae and Kapahi Bridges
DATE/TIME: November 20, 2013 – 5:30 pm
LOCATION: Kapaa Middle School Cafeteria
SUBJECT: Community Meeting #3
REFERENCES: Glenn Mickens Testimonial

DISCUSSION ITEMS:

1. Project Team Presentation
 - A. 5:35pm – Allan Smith
 - i. Called meeting to order
 - ii. Introduction of project and describe the meeting agenda
 - iii. Project background
 - a. Previous meetings
 - b. Project team to present findings
 - B. 5:36pm – Tonia Moy
 - i. Overview of Federal Process
 - a. Section 106 process
 - ii. Recapped community input from previous meetings
 - iii. Informed community that current meeting is intended to complete Section 106 process
 - iv. Presented findings of Traffic Study
 - a. Existing 1-lane bridges provide a service level of “A”
 - b. 1-lane bridge will still provide service level “A” based on projected developments
 - C. 5:42pm – Mike Hunnemann
 - i. Presented Opaekaa findings
 - a. Provided description
 - b. Presented 1-lane bridge design
 - c. Presented Area of Potential Effect (APE) & staging areas
 - d. Section 106 determination
 - (1) Anticipating a determination of “No Adverse Effect” with conditions.
 - (2) Presented conditions to obtain determination.
 - e. Opaekaa Q&A (see comments section below)
 - D. 6:03pm – Mike Hunnemann
 - i. Presented Puuopae findings
 - a. Presented 1-lane bridge design

- b. Presented Area of Potential Effect (APE) & staging areas
 - c. Section 106 determination
 - (1) Anticipating a determination of “No Adverse Effect” with conditions.
 - (2) Presented conditions to obtain determination.
 - d. Puuopae Q&A (see comments section below)
- E. 6:13pm – Mike Hunnemann
- i. Presented Kapahi findings
 - a. Presented 1-lane bridge design
 - b. Presented Area of Potential Effect (APE) & staging areas
 - c. Section 106 determination
 - (1) Anticipating a determination of “No Adverse Effect” with conditions.
 - (2) Presented conditions to obtain determination.
 - d. Kapahi Q&A (see comments section below)
 - ii. Presented anticipated design and construction schedules
- F. 6:23pm – General Question & Answer Session (see comments section below)
- G. 6:54pm – End of Meeting
2. Questions from Community
- (NOTE: “C” will indicate “Community Member” and “P” Project Team)
- A. C – Stated that the change in structural system from steel to concrete could be a significant effect on the bridge.
- i. P – Acknowledged, then stated that project team has already met with the SHPD and KHPRC and HHF and they indicated that they would concur with the “no adverse effect with conditions” determination.
 - ii. C – Asked if FHWA had submitted an official letter requesting determination.
 - iii. P – No, will be submitted after community meetings complete.
 - iv. C – Stated that Opaekaa Bridge has an interesting history and whether a plaque describing the bridge’s history could be placed at the bridge to mitigate the negative effect.
 - v. P – Acknowledged request.
- B. C – Asked about the thought process on the placement of the “bike sharrows” on the bridges.
- i. P – Placement of sharrows not finalized. Intended to alert drivers that bicyclists may also use the bridge.
 - ii. C – Questioned the use of two sharrows showing travel in opposing directions. Believes it indicates two way traffic on a 1-lane bridge and believes it is confusing. Suggested placing sharrow along centerline of bridge.
 - iii. P – Acknowledged concern and will take into consideration during the design process.
 - iv. C – Questioned use of sharrow because it indicates that drivers must share the road with bicyclist and the bridge is not wide enough for a vehicle and bicyclist side-by-side.
 - v. P – Stated that they believe the use of sharrow indicates that the bicyclist has the right to use the entire lane. Will verify during design process.
 - vi. C – Asked if there will be signs indicating bike use.
 - vii. P – Yes, signs can be installed to alert drivers.
 - viii. C – Reiterated other members comment on placing the sharrow on the centerline
- C. C – Will there be signs indicated a 1-lane bridge.
- i. P – Yes.
- D. C – Mentioned that at a previous meeting a vote was taken and a 2-lane bridge won the vote.

- i. P – The vote was not to decide the design
- ii. C – Expressed disapproval
- E. C - Why is Puuopae steel but Opaekaa concrete?
 - i. P – Puuopae is shorter so a steel design could be used to better match the existing look.
 - ii. C – Was the decision to use steel based on the historical aspects even though there are maintenance issues?
 - iii. P – Yes, steel was used based on the historic characteristics and design considerations.
- F. C – Will intersection of Puuopae and Kipapa Rd’s grade be fixed? There is an elevation change of 3 to 5-ft that makes it hard to see cars.
 - i. P – Acknowledged and will verify sight lines and distances during design.
- G. C – What is approximate timeline for construction?
 - i. P – 12-18 months
- H. C – Puuopae staging area on state lands that are lower than road with drainage problems, will the grade be fixed
 - i. P – Staging areas will be on road surface and not on the land in question.
 - ii. C - Acknowledged
- I. C – Are the side railings of Kapahi made of wood?
 - i. P – No, galvanized steel painted white.
- J. C – How often has Kapahi Bridge been washed out?
 - i. P – As recently as last year the railings were washed out.
 - ii. C - The wood railings are easily replaced when washed out, how quickly could the steel railings be replaced.
 - iii. P – Railings will be designed to withstand flood forces, so they will not need be replaced.
- K. C – What is the cost of the bridge?
 - i. P – 1.5 to 2.0 Million Dollars
- L. C – Testimony by Glenn Mickens (see attached written testimony)
- M. C – If bidding is in FY15, does that mean construction starts same year?
 - i. P – To date, Kapahi has funding for construction and other two do not. If bid in FY15, Kapahi construction should also begin that year.
- N. C – Responded to statement read by Glenn Mickens and stated that most of the community wanted a 1-lane bridge and referred to meetings from 2003. Also stated that the first community meeting, where most of the community wanted a two-lane bridge, had about 11 attendees and was held in the homesteads and she was not aware that the meeting was taking place.
- O. Larry Dill – Concurred that most of the community at homestead meeting wanted a 2-lane bridge and in other meetings most wanted 1-lane. Larry also reiterated the federal requirements and process required to obtain federal funding and reiterated traffic study that concluded the 1-lane bridge provides an adequate level of service. He also talked about Consultants being mandated to put in safety features and that the historic review process is required by law.
- P. C – Began with disclaimer explain that he works for Public Works but also lives in Kapahi. Talked about Counties plans for “Complete Streets” and that the County is looking at all the island roads and sharing them among bikes and vehicles. Stated he used to be in the 2-lane camp and gave a personal story about his family and emotional connection with 1-lane bridges. Stated that structural solutions look appropriate and asked if a wood-like material could be used on Kapahi so the wood planks would not need to be replaced as they wear.
- Q. C – Asked when the draft EA would be published.
 - i. P – Kapahi anticipated for Feb. 2014 and noted that would be a State EA, not Federal.
 - ii. C - Asked about CAT-EX

- iii. P - Federal representatives not in attendance, so Project Team not sure.
- R. C - Asked if traffic calming measures leading the bridges have been looked at. State that cars travel at high speeds leading to bridges.
 - i. P – Additional measures can be explored and discussed with the County.
- S. C – How wide is Puuopae?
 - i. P – 12'-6"
 - ii. C – Same as now? Should make it a little wider. Can emergency vehicles fit?
 - iii. P – Emergency vehicles can fit.
- T. C – Surprised Section 106 prevails over community and that safety is not being addressed. Why not make wider for people? Asked is elevation change between bridge and Kipapa Road will be addressed? If it remains 1-lane, fixing the elevation change will make it safer.
 - i. C – Stated that road on Kipapa side has a steep drop-off and guardrails should be installed. State the County is wasting money and should spend money more wisely.
- U. C – Pleased that the Section 106 process resulted in what community wanted and overwhelming amount wanted 1-lane bridge. Also stated that Kipapa Rd elevation should be addressed.
- V. C – State that 1-lane bridges are safe, drivers are not. In future cars will protect us from ourselves and history should be preserved.
- W. C – Will powerpoint be online?
 - i. P – Yes
 - ii. C – County website
 - iii. P – Yes
- X. C – Drainage a flood problems at Puuopae should be addressed.
- Y. C – Gave story about history of bridge and expressed appreciation for making the bridge safe for emergency vehicles and asked to recognize County for hard work.
- Z. C – School bus parking should be looked at for bus stop at Puuopae.
 - i. P – Can look at and discuss with County
- AA. C – Consultant should consider how children will cross Puuopae during construction because parents drop their kids off at the bridge.

3. 6:54 pm - End of Meeting.

NEIL ABERCROMBIE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING
601 KAMOKILA BLVD STE 555
KAPOLEI HI 96707

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ESTHER KIA'AINA
FIRST DEPUTY

WILLIAM M. TAM
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

DATE: March 20, 2013

LOG: 2013.2096

DOC: 1303RS28

TO: Mr. Kuppusamy Venkatesan
Public Works Engineering
County of Kauai
444 Rice Street, Room 175
Lihue, HI 96766

SUBJECT: **National Historic Preservation Act (NHPA) Section 106**
Project: Kapahi Bridge replacement
Owner: County of Kauai
Address: Kapaa Stream
Tax Map Key: (4) 4-6-004

Date Received by SHPD: March 1, 2013

Description of Project/Undertaking: Replacement of existing bridge with steel girder frame, reinforced concrete deck, raised sidewalk on one side, four foot wide bicycle lane on the other. Existing abutments to remain, but support to be provided by new abutments placed behind those existing. Bike lane to be separated from traffic lane by striping. Bridge width to be increased from existing 15 feet to 22.5 feet. FHWA funds are to be used in this undertaking.

Area of Potential Effect (APE): Bridge footprint and approaches.

Description of Resource: Bridge originally constructed approximately 1937 and reconstructed in 1977. Poured-in-place concrete abutments supplemented by stone. Timber planks on steel girders. Timber railings.

Eligibility: Identified as Category III Bridge ("little historic significance") in 1989 county inventory and not included in 2008 Statewide Draft Bridge Inventory. The County of Kauai has compiled a Hawaii Intensive Architectural Survey Report for the Bridge which carries the same conclusion.

SHPD disagrees for several reasons. First, the structure uses steel stringers, a material not often used in Hawaii due to our exposure to salt air. Second, the structure also has a wood deck, which the Architectural Survey Report states was rare because of a deliberate policy by the Territorial Highways Department (and, by implication, other government transportation divisions) to replace such bridges in the 20th century with lower maintenance cost concrete bridges. Third, as architectural/engineering documentation is thin for this particular bridge prior to 1977, it cannot be determined whether the 1977 work was "maintenance" or "redesign". Fourth, the present design complements the historic rural nature of this area.

Thus, we must treat the bridge as a historic resource, eligible for the Hawaii Register under Criteria A (Events – development of roadways in the area to assist homesteading) and C (period Architecture)

Documentation Received: Photographs, Architectural Survey Report

SHPD Determination: *The project will have affect.*

This project has already had several iterations, including suggested use of the existing bridge for pedestrian access and construction of a new vehicular bridge immediately makai.

SHPD comments:

- 1) We commend the County for proposing use of steel girders in the new design. This reflects what has been on site for 35 years.
- 2) We recognize the need for emergency vehicle access to the area and support having bridges that can support the weight of such vehicles.
- 3) The current proposal would create, in effect through use of the four foot bike lane, a wider roadway that has been opposed by members of the community. As there is no designated or separate bike path to or from the bridge, we do not understand the incorporation of this feature.
- 4) Given the existing bridge has a wood plank surface, we strongly recommend that wood, or visually similar material, be placed upon the concrete deck to retain this feature. We also recommend that the existing railing be replicated to also retain character.
- 5) A raised sidewalk is proposed on one side. This should also be covered with wood or a wood-like material to retain the rural character of the bridge. The height of the sidewalk could be designed so that, in emergencies, the width of the sidewalk could be employed to facilitate multiple emergency vehicle access.
- 6) The present alignment of the bridge is such that right turns from the bridge have become an issue. We request that any design accommodate a wider turning radius by using space off the bridge rather than on it.

We look forward to your response.

Any questions should be addressed to Ross W. Stephenson, SHPD Historian, at (808) 692-8028 (office) or ross.w.stephenson@hawaii.gov.

Mahalo for the opportunity to comment.



Angie Westfall
Architecture Branch Chief, Hawaii Historic Preservation Division

In the event that historic resources, including human skeletal remains, lava tubes, and lava blisters/bubbles are identified during construction activities, all work should cease in the immediate vicinity of the find, the find should be protected from additional disturbance, and the State Historic Preservation Division should be contacted immediately at (808) 692-8015.

[This page intentionally left blank]

KAPAHI BRIDGE REHABILITATION ENVIRONMENTAL ASSESSMENT

TMKs (4th): 4-6-04

Kawaihau District, County of Kaua‘i, State of Hawai‘i

Submitted Pursuant to Chapter 343, Hawai‘i Revised Statutes (HRS)
County of Kaua‘i, Department of Public Works

APPENDIX 3 Water Quality and Biological Report

[This page intentionally left blank]

**Water quality, biological, and ordinary high
water mark surveys for the Kapahi Bridge
replacement, Kapa'a, Kaua'i.**



Prepared by:

AECOS, Inc.

45-939 Kamehameha Hwy, Suite 104
Kāne'ohe, Hawai'i 96744-3221

April 10, 2012

Water quality, biological, and ordinary high water mark surveys for the Kapahi Bridge replacement Kapa'a, Kaua'i.

April 10, 2012

Draft

AECOS No. 1281

Chad Linebaugh, Susan Burr, Eric Guinther, and Reginald David¹
AECOS, Inc.
45-939 Kamehameha Hwy, Suite 104
Kāne'ohe, Hawai'i 96744
Phone: (808) 234-7770 Fax: (808) 234-7775 Email: aecos@aecos.com

Introduction

In October 2011, AECOS, Inc. biologists conducted biological resource, water quality, and ordinary high water mark (OHWM) surveys of Kapa'a Stream located on the Island of Kaua'i (Fig 1). The Kapahi Bridge over Kapa'a Stream is to be replaced with a similar structure located approximately 30 ft (9 m) downstream of the existing bridge.

Section 404 of the Clean Water Act (CWA) assigns regulatory authority to the U.S. Army Corps of Engineers (USACE) over certain activities in "waters of the U.S." Kapa'a Stream is clearly jurisdictional² as it is a perennial stream (termed a relatively permanent water or RPW in regulatory jargon) that flows into a traditionally navigable water (TNW; that is, the Pacific Ocean). The Kapahi Bridge replacement project will involve construction between the OHWMs of Kapa'a Stream, requiring a Department of the Army permit to construct. AECOS was contracted by Kai Hawaii³ to investigate biological resources and water quality in the proposed project area and delineate the OHWM at the project site. This report details findings of those surveys.

¹ Rana Biological Consulting, Inc., Kailua-Kona, Hawai'i.

² The term "jurisdictional waters" is synonymous with "waters of the U.S.," meaning aquatic features that fall under the regulatory authority of the federal government.

³ This document will be incorporated into the Environmental Assessment (EA) for the project and become part of the public record.

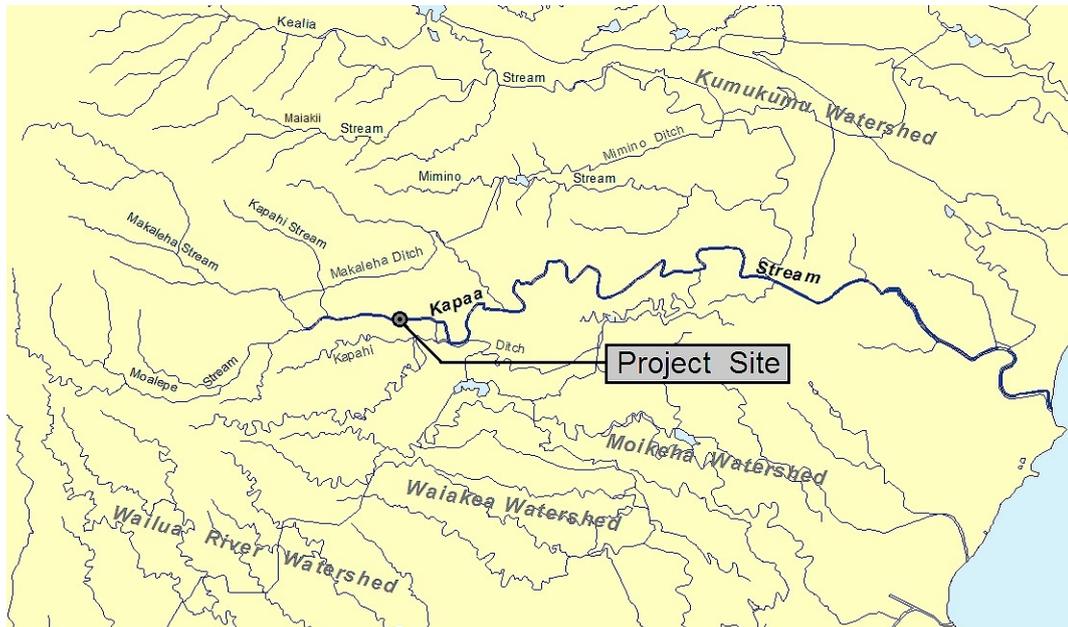


Figure 2. The project's location in the Kapa'a Stream watershed.

Methods

Water Quality

Field measurements for temperature, dissolved oxygen, and pH were conducted and water samples for analysis of conductivity, total suspended solids, turbidity, nitrate-nitrite nitrogen, total nitrogen, and total phosphorus were collected from three stations in Kapa'a Stream near the Kapahi Bridge. All water samples were collected in screw cap-polypropylene bottles on October 20, 2011 and delivered to AECOS laboratory in Kane'ohe, O'ahu for laboratory analyses (AECOS Log No. 27654). Table 1 lists analytical methods and instrumentation used in the analyses.

Station "Upstream" was located from approximately 215 ft (65 m) upstream from the Kapahi Bridge (Kawaihau Road) crossing Kapa'a Stream. Station "Bridge" was located beneath the bridge slated for removal. Station "Downstream" was located 115 ft (35 m) downstream from the same bridge. All stations were located near the center of the wetted width of the stream and all water samples were collected from just below the stream surface. Water quality stations are depicted in Figure 3.

Table 1. Analytical methods and instruments used for water quality analyses of Kapa'a Stream waters sampled on October 20, 2011.

Analysis	Method	Reference	Instrument[†]
Conductivity	SM 2510-B	Standard Methods, 20th Edition (1998)	Hydach pH/conductivity meter
Dissolved Oxygen	SM 4500-O G	Standard Methods 20th Edition (1998)	YSI Model 550A Dissolved Oxygen Meter
Nitrate + Nitrite	EPA 353.2	USEPA (1993)	Technicon AutoAnalyzer II
pH	SM 4500 H+	Standard Methods 20th Edition (1998)	Hannah pocket pH meter
Temperature	thermister calibrated to NBS. Cert. thermometer SM 2550 B	Standard Methods 20th Edition (1998)	YSI Model 550A Dissolved Oxygen Meter
Total Nitrogen	NCASI TNTP-10900	NCASI (2011)	Technicon AutoAnalyzer II
Total Phosphorus	EPA 365.3	USEPA (1993)	Technicon AutoAnalyzer II
Total Suspended Solids	Method 2540 D	Standard Methods 20th Edition (1998)	Mettler H31 balance
Turbidity	EPA 180.1 Rev 2.0	EPA (1993)	Hach 2100N Turbidimeter

[†] typical instruments listed, others may be substituted.

Ordinary High Water Mark

On October 21 2011, *AECOS* scientists surveyed Kapa'a Stream in the area of Kapahi Bridge and the proposed location of the new bridge to establish the OHWM. An approximately 120-m (400-ft) segment was surveyed to assess biological and physical characteristics, which serve as indicators of water flow. Clean Water Act (CWA) jurisdiction in streams extends across the stream bed and up the banks to the OHWM, defined in federal regulations [33 CFR 328.3(e)] as:

“... the line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.”

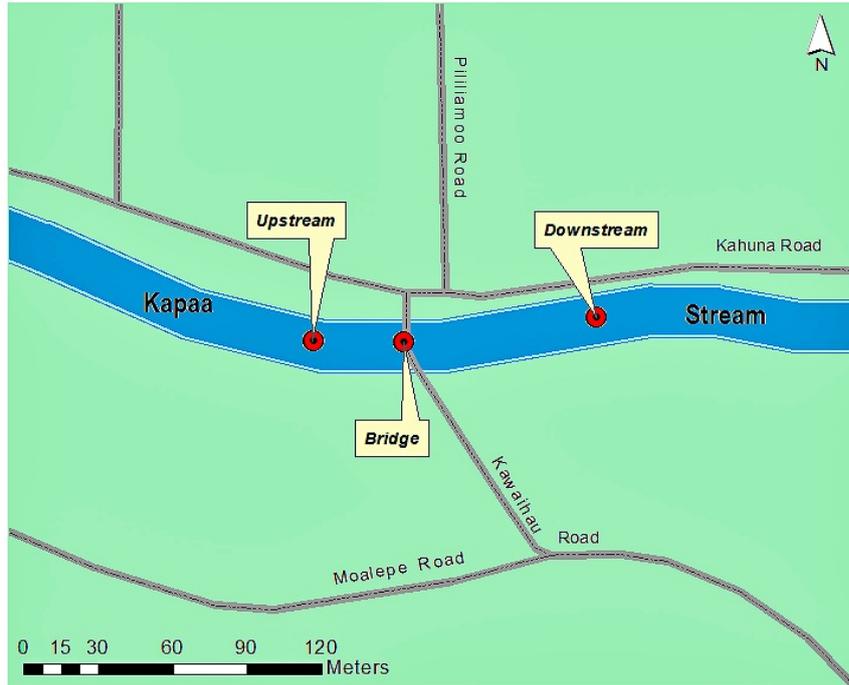


Figure 3. The locations of water quality stations in Kapa'a Stream near the Kapahi Bridge sampled on October 20, 2011.

A regulatory guidance letter (USACE, 2005) provides the following list of physical characteristics to be considered when making an OHWM determination:

- | | |
|-----------------------------------------|--------------------------------------|
| Natural line impressed on the bank | Leaf litter disturbed or washed away |
| Shelving | Scour |
| Changes in the character of the soil | Deposition |
| Destruction of terrestrial vegetation | Multiple observed flow events |
| Presence of litter and debris | Bed and banks |
| Wracking | Water staining |
| Vegetation matted down, bent, or absent | Change in plant community |
| Sediment sorting | |

All of the above physical characteristics were considered by AECOS scientists in marking the OHWM in the field with small flags on wire stakes placed (on opposite sides of the stream) approximately every 10 m (33 ft). Four pairs flags were located upstream of Kapahi Bridge and six pairs were placed downstream of the bridge. A set of photographs (left bank, right bank, upstream, downstream,) were taken from the center of the stream at each pair of flags to

document the process and to characterize the stream physiography (Appendix A). Shortly after flagging of the OHWM, land surveyors surveyed the area and prepared project maps that incorporated the OHWM flag locations (Appendix B). This report describes the methodology used to establish the OHWM in the project area. However, all such efforts are subject to review by the U.S. Army Corps of Engineers (Corps), and are not official until the map submitted to the Corps is accepted and certified.

Riparian Vegetation

A survey of the flora in the immediate vicinity of the existing Kapahi Bridge and for 400 ft (125 m) along both sides of the stream downstream of the bridge and 400 ft (125 m) upstream along the left bank and 180 ft (54 m) upstream along the right bank from the bridge was conducted (by Guinther) on October 20, 2011. Plant species growing within a distance of about 30 to 40 ft (10 to 12 m) from the stream banks were identified. At the proposed location of the new bridge, this distance extends to a paved Kauna Road on the north and an agricultural field on the south. Species names follow the nomenclature in *Manual for the Flowering Plants of Hawai'i: Volumes I and II* (Wagner et al., 1990) and *Hawai'i's Ferns and Fern Allies* (Palmer, 2003), and as updated by various more recently published papers.

Aquatic Biota

Aquatic resources of the stream were identified by surveying aquatic biota present at numerous locations within Kapa'a Stream. On October 20, a survey was conducted encompassing 250 ft (75 m) upstream and downstream of the existing Kapahi bridge crossing. On October 21, survey locations included Kapa'a Stream from 250 ft downstream of the Kapahi Bridge to its confluence with Kapahi Stream, a brief segment of Kapahi Stream, and Makaleha Stream from its confluence with Kapaa Stream to the 1200-ft elevation in the south branch. Dip nets were used to collect biota for verification of field identifications. A sample for algae identification was collected by scraping the surface of a small cascade near the project site. The sample was placed in a plastic bottle and chilled on ice for delivery to the laboratory for microscopic examination. Algae were identified with the aid of *Stream macroalgae of Hawai'i: An identification guide to the common genera* (Sherwood, 2004).

Avian Survey Methods

One avian point count station was situated on the north east side of the bridge in a location that shielded the sound of the rushing water in Kapa'a Stream. One

8-minute point count was made at this count station. The rest of the site was walked so as to provide a better understanding of the avian species that utilize resources within the project area. Additionally, a 30-minute time dependent waterbird count was conducted from the bridge. Field observations were made with the aid of Leica 10 X 42 binoculars and by listening for vocalizations. A running tally was kept of all bird species recorded during the time spent on the site.

Avian phylogenetic order and nomenclature used in this report follow the *AOU Check-List of North American Birds* (American Ornithologists' Union, 1998), and the 42nd through the 52nd supplements to the Check-List (American Ornithologists' Union 2000; Banks et al., 2002, 2003, 2004, 2005, 2006, 2007, 2008; Chesser et al., 2009, 2010, 2011).

Mammalian Survey Methods

With the exception of the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*; 'ōpe'ape'a), all terrestrial mammals currently found on the Island of Kaua'i are alien species. Most are ubiquitous. The survey of mammals was limited to visual and auditory detection, coupled with visual observation of scat, tracks, and other animal sign. A running tally was kept of all vertebrate species observed, heard, or detected by other means within the general project area.

Survey Results

Water Quality

The results from *in situ* measurements and analyses of water samples collected from three stations in Kapa'a Stream on October 20, 2011 are provided in Table 2. During the survey period, water flow extended the width of the stream channel beneath the bridge. The slightly turbid stream waters were generally 18 in (45 cm) deep along the left bank and about 4 ft (1.2 m) deep along the right bank. Waters in proximity to the project site were saturated with oxygen during the sampling event with DO concentrations ranging from 8.00 to 9.12 mg/l, representing saturation ranging from 91 to 103% at measured temperatures. All stations had pH values near neutral with individual readings ranging from 7.00 to 7.37.

A conductivity of 88 μ mhos/cm was measured at each of the three stations. Particulates, as measured by total suspended solids (TSS), were low: ranging

from 0.8 to 1.8 mg/l. Particulates measured as turbidity ranged from 1.88 ntu at Stas. Upstream and Downstream to 2.16 ntu at Sta. Bridge.

Table 2. Water quality results for samples collected on October 20, 2011 from three stations in Kapa'a Stream.

Station	Time	Temp. (°C)	Dissolved Oxygen (mg/l)	Dissolved Oxygen (% sat.)	pH	Conductivity (µmhos/cm)
Upstream	1506	21.4	8.81	100	7.06	88
Bridge	1448	21.5	8.00	91	7.37	88
Downstream	1435	21.5	9.12	103	7.36	88
	TSS (mg/l)	Turbidity (ntu)	Nitrate+ Nitrite (µg N/l)	Total N (µg N/l)	Total P (µg P/l)	
Upstream	0.8	1.88	32	199	9	
Bridge	1.8	2.16	32	97	15	
Downstream	1.5	1.88	31	133	10	

Nutrient concentrations were low. Nitrates were essentially the same at all three stations. Total nitrogen concentrations were below 200 µg N/l at Stas. Upstream and Downstream and only 97 µg N/l at Sta. Bridge. Total P results were low, ranging from 9 to 15 µg P/l. The samples demonstrate small trhe variability over short distances in a relatively swift flowing stream, and could be combined into means, as no upstream-downstream trends are evident.

Riparian Vegetation

Riparian vegetation near Kapahi Bridge is confined to a relatively narrow corridor, especially along the left bank where Kahuna Road parallels the stream just above the bank. A variety of common ruderal species occupy the road verge above the left bank in the Project area. Above the right bank downstream of Kapahi Bridge, agricultural activity—presently, tobacco (*Nicotiana tabacum*) is being grown in the Project area—extends away from the riparian vegetation

zone in that area. Guinea grass (*Panicum maximum*) and mowed or graded ground separates the riparian vegetation and agricultural vegetation downstream from the bridge.

Only along the right bank upstream of the bridge is there a more or less continuous forest vegetation extending away from the stream. Despite the confined area of the riparian zone in most of the survey area, this zone is largely dominated by trees (mostly mango, breadfruit, *kukui*, and rose apple), shrubs (especially Turk's cap or *Malvaviscus pendiflorus*), and vines (wood rose or *Merremia tuberosa* and pothos or *Epipremnum pinnatum*) that provide shading to the stream. Near the bridge itself, where trees are absent, elephant grass (*Pennisetum purpureum*) occupies the left bank. In other areas, wedelia (*Sphagneticola trilobata*) and *honohono* or dayflower (*Commelina diffusa*) are abundant above the stream banks. Yellow-flowered ginger (*Hedychium flavescens*) and Job's tears (*Coix lachryma-jobi*) are common along the stream down from the bridge.

In all, 77 species of ferns and flowering plants were identified from the riparian zone in the Project area (Table 4). Of these, 5 species (6.5%) are considered plants indigenous to the Hawaiian Islands; however, all five are rare in the Project area. Another 6 species (7.8%) are early Polynesian introductions (so-called "canoe plants"), some of which are plentiful here. The remaining 66 species are plants introduced (non-native) and now naturalized in the Islands. Naturalized species are not regarded as special or deserving of protection, although larger trees that shade the stream certainly do provide a useful ecological function.

Table 3. Checklist of plants on Kapa'a Stream banks near Kapahi Bridge.

Family	<i>Genus species</i>	Common name	STATUS	ABUNDANCE
PTERIDOPHYTES - FERNS & FERN ALLIES				
THELYPTERIDACEAE				
	<i>Christella dentata</i> (Forssk.) Brownsey & Jermy	wood fern	Nat	U3
POLYPODIACEAE				
	<i>Phlebodium aureum</i> (L.) J. Sm.	hare's-foot fern	Nat	R
PSILOTACEAE				
	<i>Psilotum nudum</i> (L.) P. Beauv.	<i>moa</i>	Ind	R

Table 3 (continued).

Family	<i>Genus species</i>	Common name	STATUS	ABUNDANCE
FLOWERING PLANTS - DICOTS				
ACANTHACEAE	<i>Thunbergia fragrans</i> Roxb.	sweet clock-vine	Nat	R
ANACARDIACEAE	<i>Mangifera indica</i> L.	mango	Nat	R
	<i>Schinus terebinthifolius</i> Raddi	Christmasberry	Nat	R
ASTERACEAE	<i>Ageratum conyzoides</i> L.	<i>maile hohono</i>	Nat	R <n>
	<i>Conyza bonariensis</i> (L.) Cronq.	hairy horseweed	Nat	R
	<i>Elephantopus mollis</i> Kunth	---	Nat	R <n>
	<i>Emilia fosbergii</i> Nicolson	Flora's paintbrush	Nat	R
	<i>Sphagneticola trilobata</i> L.	wedelia	Nat	A
	<i>Youngia japonica</i> (L.) DC	Oriental hawksbeard	Nat	R
ARALIACEAE	<i>Polyscias guilfoylei</i> (W. Bull.) L. H. Bailey	common plantain	Nat	R
BIGONACEAE	<i>Spathodea campanulata</i> P. Beauv.	African tulip tree	Nat	R
CONVOLVULACEAE	<i>Merremia tuberosa</i> (L.) Rendle	wood rose	Nat	R
CUCURBITACEAE	<i>Momordica charantia</i> L.	balsam pear	Nat	R
EUPHORBIACEAE	<i>Aleurites moluccana</i> (L.) Wild.	<i>kukui</i>	Pol	U1
	<i>Ricinus communis</i> L.	castor bean	Nat	R
FABACEAE	<i>Desmodium incanum</i> DC	Spanish clover	Nat	C1
	<i>Falcataria moluccana</i> (Miq.) Barneby & Grimes	albizia	Nat	R
	<i>Indigofera suffruticosa</i> Mill.	indigo	Nat	R
	<i>Leucaena leucocephala</i> (Lam.) deWit	koa haole	Nat	U
	<i>Macroptilium atropurpureum</i> (DC) Urb.	---	Nat	C
	<i>Mimosa pudica</i> var. <i>unijuga</i> (Duchass. & Walp.) Griseb.	sensitive plant	Nat	C
	<i>Mucuna gigantean</i> (Willd.) DC	<i>kā'e'e</i> , sea bean	Ind	R
LAURACEAE	<i>Cinnamomum camphora</i> (L.) J. Presl.	camphor tree	Nat	R <n>
	<i>Persea americana</i> Mill.	avocado	Nat	R

Table 3 (continued).

Family	<i>Genus species</i>	Common name	STATUS	ABUNDANCE
MALVACEAE				
	<i>Hibiscus tiliaceus</i> L.	<i>hau</i>	Ind	R
	<i>Malvaviscus pendiflorus</i> DC	Turk's cap	Nat	C
	<i>Sida rhombifolia</i> L.	<i>'ilima</i>	Ind	R
MELASTOMATACEAE				
	<i>Clidemia hirta</i> (L.) D. Don	Koster's curse	Nat	R
MORACEAE				
	<i>Artocarpus atilis</i> (Z) Fosberg	<i>'ulu</i> , breadfruit	Pol	U2
	<i>Ficus microcarpa</i> L. fil.	Chinese banyan	Nat	R
MYRTACEAE				
	<i>Eugenia uniflora</i> L.	Surinam cherry	Nat	R
	<i>Psidium cattleianum</i> Sabine	strawberry guava	Nat	R
	<i>Psidium guajava</i> L.	common guava	Nat	R
	<i>Syzygium jambos</i> (L.) Alston	rose apple	Nat	O
PLANTAGINACEAE				
	<i>Plantago major</i> L.	common plantain	Nat	R
RUBIACEAE				
	<i>Hedyotis corymbosa</i> (L.) Lam.	---	Nat	R
RUTACEAE				
	<i>Citrus</i> sp.	---	Orn?	R <n>
SOLANACEAE				
	<i>Nicotiana tabacum</i> L.	tobacco	Orn	R3
	<i>Syzygium cumini</i> (L.) Skeels	<i>pōpolo</i>	Ind	R
SAPINDACEAE				
	<i>Filicium decipiens</i> (Wight & Arnott) Thwaites	fern tree	Nat	R
VERBENACEAE				
	<i>Stachytarpheta urticifolia</i> (Salisb.) Sims	vervain	Nat	R
FLOWERING PLANTS - MONOCOTS				
AGAVACEAE				
	<i>Cordyline fruticosa</i> (L.) A. Chev.	ti; <i>kī</i>	Pol	R
	<i>Dracaena sanderiana</i> M.T. Masters	sanderiana	Orn	R
ARACEAE				
	<i>Dieffenbachia maculata</i> (Loddiges) G. Don	dieffenbachia	Nat	R
	<i>Epipremnum pinnatum</i> (L.) Engl.	pothos	Nat	O
	<i>Syngonium</i> sp.	nephtyitis	Nat	R
	<i>Xanthosoma violaceum</i> Schott	blue <i>'ape</i>	Orn	R

Table 3 (continued).

Family	<i>Genus species</i>	Common name	STATUS	ABUNDANCE
ARECACEAE				
	<i>Cocos nucifera</i> L.	coconut palm; <i>niu</i>	Pol	R
CANNACEAE				
	<i>Canna indica</i> L.	Indian-shot	Nat	R
COMMELINACEAE				
	<i>Commelina diffusa</i> N.L. Burm.	day flower; <i>honohono</i>	Pol	A
COSTACEAE				
	<i>Costus speciosus</i> (J. König) J. E. Smith	Malay ginger	Orn	R
CYPERACEAE				
	<i>Cyperus cf. meyenianus</i> Kunth	Meyen's flatsedge	Nat	R
	<i>Cyperus involucratus</i> Rott.	umbrella sedge	Nat	R
	<i>Kyllinga nemoralis</i> (J.R. Forster & G. Forster) Dandy ex Hutchinson & Dalziel	white kyllinga; <i>kili'o'opu</i>	Nat	C
HELICONIACEAE				
	<i>Heliconia</i> sp.	---	Orn	R <n>
MUSACAEAE				
	<i>Musa acuminata</i> Colla	banana	Pol	R
POACEAE (GRAMINEAE)				
	<i>Axonopus compressus</i> (Sw.) P. Beauv.	brd-lf carpetgrass	Nat	U2 <r>
	<i>Axonopus fissifolius</i> (Raddi) Kuhlm.	nrw-lf carpetgrass	Nat	R
	<i>Chloris cf. gayana</i> Kunth	Rhodes grass	Nat	O2
	<i>Chloris virgata</i> Sw.	feather fingergrass	Nat	R
	<i>Coix lachryma-jobi</i> L.	Job's tears	Nat	C1
	<i>Digitaria</i> sp.	crabgrass	Nat	R
	<i>Echinochloa crus-galli</i> (L.) P. Beauv.	barnyard grass	Nat	R
	<i>Eleusine indica</i> (L.) Gaertn.	wiregrass	Nat	O <r>
	<i>Eragrostis pectinacea</i> (Michx.) Nees	Carolina lovegrass	Nat	C1 <r>
	<i>Oplismenus hirtellus</i> (L.) P. Beauv.	basketgrass	Nat	R3
	<i>Panicum maximum</i> Jacq.	Guinea grass	Nat	A
	<i>Paspalum conjugatum</i> Bergius	Hilo grass	Nat	C1 <r>
	<i>Pennisetum purpureum</i> Schumach.	elephant grass	Nat	U2
	<i>Setaria gracilis</i> Kunth	yellow foxtail	Nat	R
	<i>Setaria palmifolia</i> (L. König) Stapf	palmgrass	Nat	R
	<i>Sporobolus indicus</i> (L.) R.Br.	West Indian dropseed	Nat	C1 <r>
	<i>Urochloa mutica</i> (Forssk.) T.Q. Nguyen	California grass	Nat	U
ZINGIBERACEAE				
	<i>Hedychium flavescens</i> Carey ex Roscoe	yellow ginger; <i>'awapuhi melemele</i>	Nat	C

Table 3 (continued).

Key to Table 3.

Status = distributional status

- End. = endemic; native to Hawaii and found naturally nowhere else.
- Ind. = indigenous; native to Hawaii, but not unique to the Hawaiian Islands.
- Nat. = naturalized, exotic, plant introduced to the Hawaiian Islands since 1778 and well-established.
- Orn. = exotic, ornamental or cultivated; plant not naturalized (not well-established outside of cultivation).
- Pol. = Polynesian introduction before 1778.

Abundance = occurrence ratings for plants in survey area.

- R – Rare - only one, two, or three plants seen.
 - U - Uncommon - several to a dozen plants observed.
 - O - Occasional - found regularly around the site.
 - C - Common - considered an important part of the vegetation and observed numerous times.
 - A - Abundant - found in large numbers; may be locally dominant.
- Numbers after letter indicates clustered distribution: number of plants greater than abundance category (for R, U, or O), which then becomes indication of number of clusters. For C or A number indicates species very common or abundant in limited area(s) only.

Notes:

- <n> Plant without flower or fruit; identification uncertain.
- <r> Plant found mostly in disturbed road verge; ruderal weed.

Ordinary High Water Mark

In the vicinity of Kapahi Bridge, the stream bed is approximately 6 m (20 ft) across. Boulders and cobbles are present in the stream bed and riffles, runs, and pools provide a variety of habitats upstream and downstream from the bridge. Upstream from the bridge, the stream is well-shaded with a nearly closed canopy of trees. Downstream from the bridge, the floodplain is fairly wide, though riparian vegetation is confined on the left side (by definition, based on moving in the downstream direction) by Kahuna Road and transitions to an agricultural field on the right side. On both sides, the bridge approaches are on fill, accounting for the steep banks. The left bank is largely artificial, modified to protect Kahuna Road upstream and downstream from Kapahi Bridge.

Sediment sorting and destruction of terrestrial vegetation tended to be the strongest indicators of the OHWM near Kapahi Bridge at the time of the survey. Other characteristics, namely leaf litter washed away, water staining, shelving, and deposition of sediments, were used in some instances, but were not necessarily present or consistent throughout the surveyed stream segment.

The left bank typically consists of sorted sediments with rounded boulders located below the OHWM and loamy soil located above; shelving is apparent in some places. Near Kapahi Bridge, Turk's cap (*Malvaviscus peduliflorus*) is abundant above the OHWM, but absent below. Although possibly planted here, Turk's cap is naturalized (spreading on its own) on Kaua'i. Various trees are scattered along the bank above the OHWM. Figure 4 shows the OHWM flagged

in the field (Flag 8L) and the corresponding OHWM drawn onto the photo of the left bank.



Figure 4. Location of OHWM flagged on left bank downstream of Kapahi Bridge. Terrestrial vegetation roots above OHWM, but is absent below. Sediments are sorted with rounded boulders and cobbles below OHWM and organic-rich soil above. A Java plum tree rooted at the OHWM has been undercut by stream flow and toppled into the stream.

Near Kapahi Bridge, the artificial right bank consisting of fill is nearly vertical, and the OHWM is less distinct than on the left bank. Typically upland vegetation, such as mango trees (*Mangifera indica*), pothos (*Epipremnum pinnatum*), and wood rose (*Merremia tuberosa*), are rooted here above the OHWM, though exposed roots (mango tree) and runners (vines) extend below the OHWM. Figure 5 shows the OHWM flagged in the field (Flag 3R) and the corresponding OHWM drawn onto the photo.

Aquatic Biota

The aquatic biota of Kapa'a Stream in the Project area comprises a mix of native and non-native species (Table 4). Filamentous tufts of green algae (*Rhizoclonium* sp.) are present in areas of swift water flowing near the bridge.

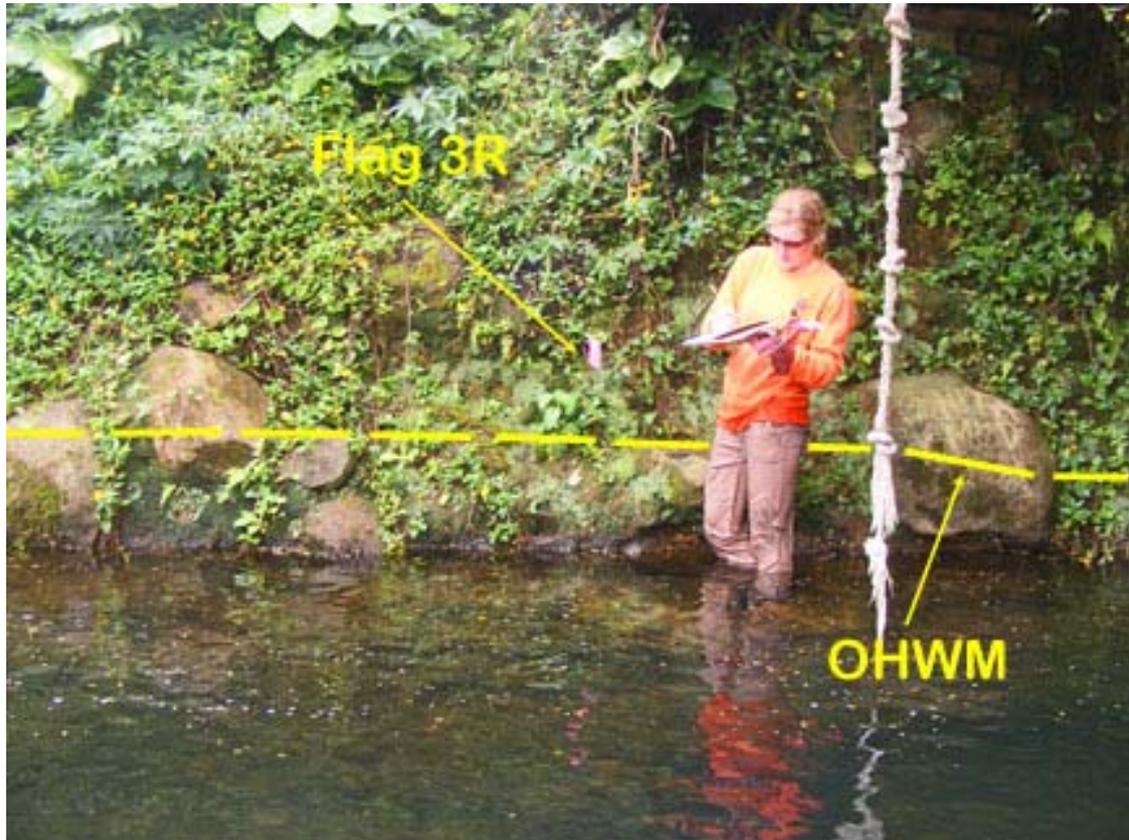


Figure 5. Location of OHWM flagged on right bank downstream of Kapahi Bridge. Terrestrial vegetation roots above OHWM, though runners extend below. Faint water staining is visible on boulders below OHWM.

Schools of mosquitofish (*Gambusia affinis*), molly (*Poecilia* spp.), and swordtail (*Xiphophorus helleri*) account for nearly all of the fish observed in the stream near the site. Indigenous 'o'opu nākea (*Awaous guamensis*) is the only native fish encountered in our survey. A few Tahitian prawn (*Macrobrachium lar*) inhabit deep or sheltered pools just upstream from the bridge. Dojo (*Misgurnus anguillicaudatus*) are seen resting on the stream bottom in leaf litter.

Upstream from the project site, in Kapa'a and Makaleha Streams, the fish community assemblage is rather different. Though the same species of topminnow fishes are present, their abundance is much lower and native stream gobies comprise the bulk of fishes in the stream. Large 'o'opu nākea are abundant, and 'o'opu nōplili (*Sicyopterus stimpsoni*) and 'o'opu 'alamo'o (*Lentipes concolor*) are common in pools from about 450 to 1200-ft (140-365 m) elevation. Despite the fact that native species like 'o'opu and the scarlet Kaua'i

damsfly (*Megalagrion vagabundum*) are the only biota encountered regularly above the confluence at 800-ft (250-m) elevation, introduced bullfrog adults and tadpoles (*Lithobates catesbeianus*) have managed to recruit to a plunge pool beneath a waterfall at the 1200-ft (365-m) elevation in the south branch of Makaleha Stream.

Table 4. List of aquatic species observed in Kapa'a Stream and tributaries.
 Note: abundance codes are presented for AECOS surveys only.

PHYLUM, CLASS, ORDER, FAMILY <i>Genus species</i>	Common name	Abundance	Status	ID Code
ALGAE				
CHLOROPHYTA				
CLADOPHORACEAE				
<i>Rhizoclonium</i> sp. Kuetzing		O	Ind	1
FERNS and ALLIES				
PTERIDOPHYTA,				
FILICOPSIDA,				
HYDROPTERIDALES				
SALVINIACEAE				
<i>Salvinia molesta</i> Mitchell	Kariba weed	A	Nat	3
FLOWERING PLANTS				
MAGNOLIOPHYTA,				
LILIOPSIDA, ALISMATALES				
HYDROCHARITACEAE				
<i>Egeria densa</i> Planch	elodea	O	Nat	3
PONTEDERIACEAE				
<i>Eichhornia crassipes</i> (Mart.) Solms	water hyacinth	A	Nat	3
INVERTEBRATES				
PLATYHELMINTHES				
TURBELLARIA, TRICLADIDA				
PLANARIIDAE				
<i>Dugesia</i> sp.	flatworm	O	Nat	1
unid.	flatworm	O	Nat	3
MOLLUSCA, GASTROPODA				
BASOMMATOPHORA				
LYMNAEIDAE				
unid.	lymnaeid snail	A	End	1
<i>Neritina vespertinus</i> Sowerby	<i>hapawai</i>		End	2,3
<i>Corbicula fluminea</i> Müller	Asiatic flume clam	A,0	Nat	2,3

Table 4 (continued).

PHYLUM, CLASS, ORDER, FAMILY	<i>Genus species</i>	Common name	Abundance	Status	ID Code
MOLLUSCA,GASTROPODA					
NEOTAENIOGLOSSA					
THIARIDAE					
	<i>Melanoides tuberculatus</i> Muller	red-rimmed melania	C,C,A,A	Nat	1,2,3,4
ARTHROPODA,INSECTA					
LEPIDOPTERA					
COSMOPTERIGIDAE					
	<i>Hyposmocoma</i> sp.	Hawaiian case-making moth	0	End	1
ARTHROPODA,INSECTA					
ODONATA					
AESHNIDAE					
	<i>Anax junius</i> Drury	green darner	R,R	Ind	1,2
COENAGRIONIDAE					
	<i>Ischnura posita</i> Hagen	fragile florktail	R	Nat	1
	<i>Ischnura ramburii</i> Selys	Rambur's forktail	R,U	Nat	1,2
	<i>Megalagrion vagabundum</i> McLachlan	scarlet Kauai damselfly	0	End	1
LIBELLULIDAE					
	<i>Crocothemis servilia</i> Drury	Chinese dragonfly	R,U,R	Nat	1,2,3
	<i>Pantala flavescens</i> Fabricius	globe skimmer	R,U	Ind	1,2
ARTHROPODA, MALACOSTRACA, DECAPODA					
ATYIDAE					
	<i>Atyoida bisulcata</i> J.W. Randall	<i>ōpae kala'ole</i>	--	End	5,6
CAMBARIDAE					
	<i>Procambarus clarkii</i> Girard	American crayfish	0	Nat	2,3,4
PALAEEMONIDAE					
	<i>Macrobrachium grandimanus</i> J.W.Randall	<i>'opae oeha'a</i>	0	Nat	3
	<i>Macrobrachium lar</i> J.C. Fabricius	Tahitian prawn	R	Nat	1,2,3,
		FISHES		--	
CHORDATA, ACTINOPTERYGII				--	
CENTRARCHIDAE				--	
	<i>Micropterus dolomieu</i> Lacèpede	smallmouth bass	0	Nat	3
CICHLIDAE				--	
	<i>Sarotherodon melanotheron</i> Rüppell	blackchin tilapia	--	Nat	2,3

Table 4 (continued).

PHYLUM, CLASS, ORDER, FAMILY	<i>Genus species</i>	Common name	Abundance	Status	ID Code
COBITIDAE					
	<i>Misgurnus anguillicaudatus</i> Cantor	dojo; oriental weatherfish	R	Nat	1
ELEOTRIDAE					
	<i>Eleotris sandwicensis</i> Vaillant and Sauvage	'o'opu 'akupa	A	End	3
GOBIIDAE					
	<i>Awaous guamensis</i> Valenciennes in Cuvier and Valenciennes	'o'opu nākea	A	Ind	1,2,3,6
	<i>Lentipes concolor</i> Gill	'o'opu 'alamo'o	C	End	1,6
	<i>Sicyopterus stimpsoni</i> Gill	'o'opu nōplili	R	End	1,6
	<i>Stenogobius hawaiiensis</i> Watson	'o'opu naniha		End	2,3
POECILIIDAE					
	<i>Gambusia affinis</i> Baird and Girard	mosquitofish	C	Nat	1,2,3,4
	<i>Poecilia reticulata</i> Peters	guppy	C	Nat	1,2,3,4,6
	<i>Poecilia</i> spp.	indet. molly	A	Nat	1,2,3
	<i>Xiphophorus hellerii</i> Heckel	swordtail	O	Nat	1,2,3,4
AMPHIBIANS					
CHORDATA, AMPHIBIA					
ANURA					
BUFONIDAE					
	<i>Rhinella marina</i> Linnaeus	cane toad	R	Nat	1,2,3,6
RANIDAE					
	<i>Lithobates catesbeianus</i> Shaw	American bullfrog	O	Nat	1,2,3,4,6
BIRDS					
VERTEBRATA, AVES					
ARDEIDAE					
	<i>Nycticorax nycticorax hoactli</i> Gmelin	<i>auku'u</i> ; Black- crowned Night Heron	R	Nat	3,4

KEY TO TABLE 4:

Abundance categories:

- R – Rare – only one or two individuals observed.
- U – Uncommon – several to a dozen individuals observed.
- O – Occasional – seen irregularly in small numbers
- C – Common -observed everywhere, although generally not in large numbers.
- A – Abundant – observed in large numbers and widely distributed.

Status categories:

- End** – Endemic – species found only in Hawai'i.
- Ind** – Indigenous – species found in Hawai'i and elsewhere.

Table 4 (continued).

- Nat – Naturalized – species introduced to Hawai'i intentionally, or accidentally.
 Location codes:
 1 – observed in Kapa'a or Makaleha Stream from 375 to 1200-ft (ASL) on Oct. 20-21, 2011
 2 – observed in Kapa'a Stream or estuary from 0 to 15-ft (ASL) on July 26, 2002 (AECOS, 2002)
 3 – observed in Kapa'a Stream lower or estuarine reach on January 17, 2008 (AECOS, 2008)
 4 – observed in unamed tributary to Kapa'a located NE of project site at 475-ft (ASL) on November 28, 2007 (AECOS, 2008)
 5 – reported in Kapa'a or Makaleha Stream from 400 to 560-ft (ASL) (Paul et al, 2004)
 6 – reported in Kapa'a or Makaleha Stream from 575 to 905-ft (ASL) (DAR Database, 2011).

Avian Survey Results

Forty-one individual birds of 11 different species and representing 10 separate families were recorded during the point count (Table 5). All of the species detected are alien to the Hawaiian Islands. Avian diversity and densities were in keeping with the vegetation present on the site, and its location. The most commonly recorded species was Nutmeg Mannikin (*Lonchura punctulata*). No waterbirds or water obligate species were detected during the course of the 30-minute time dependent waterbird count.

Table 5. Avian Species Detected at and near the Kapahi Stream Bridge on October 20, 2011.

<i>Common Name</i>	<i>Scientific Name</i>	<i>ST</i>	<i>No.</i>
PHASIANIDAE - Pheasants & Partridges			
Phasianinae - Pheasants & Allies			
Red Junglefowl	<i>Gallus gallus</i>	A	1
PELECANIFORMES			
ARDEIDAE - Herons, Bitterns & Allies			
Cattle Egret	<i>Bulbucus ibis</i>	A	5
COLUMBIFORMES			
COLUMBIDAE - Pigeons & Doves			
Rock Pigeon	<i>Columba livia</i>	A	4
Zebra Dove	<i>Geopelia striata</i>	A	3

Table 5 (continued).

<i>Common Name</i>	<i>Scientific Name</i>	<i>ST</i>	<i>No.</i>
	PASSERIFORMES		
	ZOSTEROPIDAE – White-eyes	A	7
Japanese White-eye	<i>Zosterops japonicus</i>	A	
	TURDIDAE – Thrushes		
White-rumped Shama	<i>Copsychus malabaricus</i>	A	2
	STURNIDAE - Starlings		
Common Myna	<i>Acridotheres tristis</i>		
	EMBERIZIDAE – Emberizids	A	6
Red-crested Cardinal	<i>Paroaria coronata</i>	A	4
	ICTERIDAE - Blackbirds		
Western Meadowlark	<i>Sturnella neglecta</i>	A	6
	FRINGILLIDAE – Fringilline and Carduline Finches & Allies		
	Carduelinae – Carduline Finches		
House Finch	<i>Carpodacus mexicanus</i>	A	1
	ESTRILDIDAE – Estrildid Finches		
	Estrildinae – Estrildine Finches		
<u>Nutmeg Mannikin</u>	<i>Lonchura punctulata</i>	A	12

Key to Table 5.

ST	Status
A	Alien Species
No.	Number of birds counted during point count

Mammalian Survey Results

Four mammalian species were detected during the course of this survey. We encountered tracks, scat, and sign of pig (*Sus s. scrofa*) within the forested riparian zone, and saw horses (*Equus c. caballus*) and cattle (*Bos taurus*) in pastures to the north of the stream. Additionally, several dogs (*Canis f. familiaris*) were heard barking from within private properties on both sides of the stream.

Assessment

Water Quality

Kapa'a Stream (State ID code 2-2-004) is classified by the State of Hawai'i as a perennial stream. The stream appears on the Hawai'i Department of Health list of impaired waters in Hawai'i (HDOH, 2008), prepared under Clean Water Act §303(d). The listing indicates that water quality within the stream may not meet all state water quality standards for streams (Table 6). Kapa'a Stream is listed as impaired only for turbidity in both the wet and dry seasons.

Table 6. State of Hawai'i water quality criteria for streams for wet (Nov. 1-Apr. 30) and dry (May 1-Oct. 31) seasons from HAR §11-54-05.2(b) (HDOH, 2009).

Parameter	Total Nitrogen (µg N/l)	Nitrate + Nitrite (µg N/l)	Total Phosphorus (µg P/l)	Turbidity (NTU)	Total Suspended Solids (mg/l)
Geometric mean not to exceed given value					
(dry season)	180.0	30.0	30.0	2.0	10.0
(wet season)	250.0	70.0	50.0	5.0	20.0
Not to exceed more than 10% of the time					
(dry season)	380.0	90.0	60.0	5.5	30.0
(wet season)	520.0	180.0	100.0	15.0	50.0
Not to exceed more than 2% of the time					
(dry season)	600.0	170.0	80.0	10.0	55.0
(wet season)	800.0	300.0	150.0	25.0	80.0
<ul style="list-style-type: none"> • pH – shall not deviate more than 0.5 units from ambient and not be lower than 5.5 nor higher than 8.0. • Dissolved oxygen – not less than 80% saturation. • Temperature – shall not vary more than 1 °C from ambient. • Conductivity – not more than 300 micromhos/cm. 					

During the October 20, 2011 water quality sampling, Kapa'a Stream near the Kapahi Bridge had good water quality. Turbidity levels slightly exceeded 2.0 ntu at Sta. Bridge and total suspended solids concentrations were quite low. Nitrate-nitrite concentrations were above 30 µg N/l at Stas. Upstream and Downstream, but total nitrogen concentrations ranged from only 97 to 199 µg N/l, levels considered excellent for Hawaiian streams. Values obtained in our

survey cannot be directly compared with the water quality standards in Table 6 to assess compliance because comparison requires that representative geometric mean values be calculated from a minimum of three sampling events.

A brief review of water quality in lower Kapa'a Stream was provided by AECOS (2008). Results more or less similar to our recent measurements were reported for most parameters, although total N and total P tended to be higher in the lower reach segments, and, in at least one case, much poorer water quality was found at a station located in the slow-flowing lowest reach of the stream near the stream mouth (also reported as having poor water quality by AECOS, 2002).

Riparian Vegetation

The flora in the survey area includes a number of mature trees that provide shade to Kapa'a Stream. Otherwise, there is nothing remarkable about the flora, the majority of the plants being non-native species: either naturalized species introduced in the last two centuries or by early Polynesian immigrants. None of the plant species at the Kapahi Bridge site is listed as endangered or threatened species by state (HDLNR, 1998) or federal (USFWS, 2011) regulations, and none is important from a resource conservation perspective.

Ordinary High Water Mark

Appendix B contains a map created by the surveyors that shows the flagged locations and the corresponding OHWM based upon the elevations of the flags above the stream bed at the stream segment surveyed for Kapahi Bridge.

Aquatic Resources

Aquatic biota observed during the October 2011 survey of Kapa'a and Makeleha Streams consisted of both native and introduced species. The Kapa'a Stream system is host to numerous native fish and invertebrate species present in the Hawaiian Islands. The survey data as well as numerous previously published reports indicated that native species, including 'o'opu nākea (*Awaous guamensis*), 'o'opu nōplili (*Sicyopterus stimpsoni*) 'o'opu 'alamo'o (*Lentipes concolor*) and 'opae kala'ole (*Atyoida bisulcata*) inhabit or migrate through stream waters at the proposed project site.

Upstream from the project site, Kapa'a Stream is also home to at least one known populations of Newcomb's snail (*Erinna newcombi*), a lymnaeid snail listed as threatened under the provisions of Endangered Species Act of 1972. Critical habitat for the species has been designated (USFWS, 2002) and include

two approximately 1 mi (1.59 km) stream segments in the Kapa'a Stream watershed: Makaleha Stream from 600 to 1500-ft elevation and Waipahe'e Stream (tributary to Keālia Stream) from 800 to 1200-ft elevation.

Newcomb's snail is restricted to freshwater and probably feeds on algae and vegetation growing on submerged substrata. Eggs are attached to submerged rocks or vegetation and there are no widely dispersing larval stages as the entire life cycle is generally completed within a localized stream segment (USFWS, 2002).

Avian Resources

Avian diversity and densities are in keeping with habitats present within the site. All 11 avian species recorded during this survey are alien to the Hawaiian Islands.



Figure 6. South facing side of Kaiwa Ridge showing 'uluhe (fern) covering slopes.

Although not detected during this survey, Hawaiian Petrel (*Pterodroma sandwichensis*) and the Hawaiian sub-species of Newell's Shearwater (*Puffinus auricularis newelli*) have been recorded over-flying the general project vicinity between late April and the middle of December each year (David, 1995, 2011; Morgan et al., 2003, 2004; David and Planning Solutions, 2008). Additionally, the Save Our Shearwaters Program has recovered both species from the general area on an annual basis over the past three decades (Morgan et al., 2003, 2004; David and Planning Solutions, 2008; Save our Shearwater Program, 2011). The 'uluhe (*Dicranopteris linearis*) fern-covered slopes of Kaiwa Ridge (Figure 6, above) is typical of the nesting habitat used by both species, though it is currently unknown if there are any colonies in close to the project area.

The petrel is listed as endangered, and the shearwater as threatened, under both federal and State of Hawai'i endangered species statutes. The primary cause of mortality in both Hawaiian Petrels and Newell's Shearwaters is thought to be predation by alien mammalian species at the nesting colonies (USFWS 1983; Simons and Hodges, 1998; Ainley et al., 2001). Collision with man-made structures is regarded as a second most significant cause of mortality of these seabird species in Hawai'i. Nocturnally flying seabirds, especially fledglings on their way to sea in the summer and fall, can become disoriented by exterior lighting. Disoriented seabirds may collide with manmade structures and, if not killed outright, become easy targets of predatory mammals (Hadley, 1961; Telfer, 1979; Sincock, 1981; Reed et al., 1985; Telfer et al., 1987; Cooper and Day, 1998; Podolsky et al., 1998; Ainley et al., 2001; Hue et al., 2001; Day et al 2003). No suitable nesting habitat for either of these seabird species exists in the Project area.

The principal potential impact that the Project poses to Newell's Shearwater and Hawaiian Petrel is a threat that birds will be downed after becoming disoriented by exterior lighting if used in conjunction with night construction activities, servicing of construction equipment at night, or streetlights erected for public safety reasons. To reduce the potential for adverse interactions between nocturnally flying seabirds and structures, it is recommended that any external lighting associated with the project be properly shielded (Reed et al., 1985; Telfer et al., 1987).

Mammalian Resources

The findings of the mammalian survey are in keeping with the habitats present and the general nature of the project site. It is likely that several of the four *Muridae* species: European house mouse (*Mus musculus domesticus*), roof rat (*Rattus r. rattus*), Norway rat (*Rattus norvegicus*), and Polynesian rat (*Rattus*

exulans hawaiiensis)—all known to be established on the Island of Kaua'i—occur in the vicinity of the Project on a regularly basis.

The endangered Hawaiian hoary bat was not detected during the course of this survey. It is, however, probable that this species uses resources within the general project area on a seasonal basis, as the species is all but ubiquitous in the lowlands of Kaua'i. The impact that the project potentially poses to bats is during the clearing and grubbing phases of construction as vegetation is removed. The removal of vegetation within the project site may temporarily displace bats using the vegetation for roosting. As bats use multiple roosts within their home territories, this disturbance from the removal of vegetation is likely to be minimal. However, during the pupping season, female bats carrying pups may be less able to rapidly vacate a roost site when the vegetation is cleared. Additionally, adult female bats sometimes leave their pups in the roost tree while they forage and very small pups may be unable to flee a tree that is being felled. Potential adverse impacts from such disturbance can be avoided or minimized by not clearing woody vegetation taller than 4.6 m (15 ft) between June 1 and September 15, the period when female bats are likely to be tending pups.

Conclusions

No terrestrial or aquatic species observed at the Project site is listed as threatened or endangered by the U.S. Fish and Wildlife Service under the Endangered Species Act of 1973, as amended, or by the State of Hawaii under its endangered species program (DLNR, 1998; USFWS, 2011). Furthermore, the proposed action will not result in modification of any federally designated Critical Habitat, as there is none present on or adjacent to the location proposed for project work.

A Best Management Practices (BMP) plan should be designed and implemented to minimize any environmental impacts to water quality and aquatic biota in the vicinity of the project site during construction. Stream flow should be maintained to allow passage of native species. Construction work conducted within the OHWM of the stream will require permitting from the U. S. Army Corps of Engineers as this waterway is subject to federal jurisdiction.

References

- AECOS, Inc. (AECOS). 2002. Aquatic resources survey for the Kapa'a-Kealia Bikepath, Kaua'i. Prep. for SSFM International, Inc. AECOS No. 1018. 16 pp.
- _____. 2008a Water quality and biological reconnaissance of lower Kapa'a Stream, Kapa'a, Kaua'i. Prep for Plantation Partners Kauai, LLC. AECOS No. 1135B. 20pp.
- _____. 2008b. Water quality and biological reconnaissance of tunnels, wetlands, and streams at 'Ākulikuli Tunnel Site, Keālia Forest Reserve, Kapa'a, Kaua'i. Prep. for SSFM International, Inc. AECOS No. 1157B. 33 pp.
- Department of Land and Natural Resources. (DLNR). 1998. Indigenous Wildlife, Endangered and Threatened Wildlife and Plants, and Introduced Wild Birds. Department of Land and Natural Resources. State of Hawaii. Administrative Rule §13-134-1 through §13-134-10, dated March 02, 1998.
- Grasshoff, K., M. Ehrhardt, & K. Kremling (eds.). 1986. *Methods of Seawater Analysis* (2nd edition). Verlag Chemie, GmbH, Weinheim.
- Hawai'i Department of Health (HDOH). 2008. State of Hawai'i Water Quality Monitoring and Assessment Report: Integrated Report to the U.S. Environmental Protection Agency and the U.S. Congress Pursuant to Sections §303(D) and §305(B), Clean Water Act (P.L. 97-117). 279 pp.
- _____. 2009. Hawai'i Administrative Rules, Title 11, Department of Health, Chapter 54, Water Quality Standards. 92 pp.
- Parham, J. E., G. R. Higashi, E. K. Lapp, D. G. K. Kuamo'o, R. T. Nishimoto, S. Hau, J. M. Fitzsimmons, D. A. Polhemus and W. S. Devick. 2008. Atlas of Hawaiian Watersheds and their Aquatic Resources. Island of O'ahu. Bishop Museum and Division of Aquatic Resources. 614 pp.
- Sherwood, A. 2004. Stream macroalgae of Hawai'i: An identification guide to the common genera. DAR Technical Report 04-02. 52 pp.
- Standard Methods (SM). 1998. *Standard Methods for the Examination of Water and Wastewater*. 20th Edition. (Greenberg, Clesceri, and Eaton, eds.). APHA, AWWA, & WEF. 1100 p.

- U.S. Army Corps of Engineers (USACE). 2005. Regulatory Guidance Letter 05-05 Ordinary High Water Mark (OHWM) Identification. 4 pp.
- _____. 2011. Department of Defense, Department of the Army, Corps of Engineers. 33 CFR 328.3(e). Navigation and Navigable Waters. Definition of Waters of the United States. *Federal Register*, 58 (eCFR current October 28, 2011): 45036. Available online at URL: <http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=%2Findex.tpl>; Last accessed on November 1, 2011.
- U.S. Environmental Protection Agency (USEPA). 1993. Methods for the Determination of Inorganic Substances in Environmental Samples. EPA 600/R-93/100.
- U.S. Fish and Wildlife Service (USFWS). 2011. Endangered and Threatened Wildlife and Plants. 50CFR 17:11 and 17:12. Available online at URL: http://ecos.fws.gov/tess_public/pub/stateListingIndividual.jsp?state=HI&status=listed; last accessed on November 15, 2011.

KAPAHI BRIDGE REHABILITATION ENVIRONMENTAL ASSESSMENT

TMKs (4th): 4-6-04

Kawaihau District, County of Kaua‘i, State of Hawai‘i

Submitted Pursuant to Chapter 343, Hawai‘i Revised Statutes (HRS)
County of Kaua‘i, Department of Public Works

APPENDIX 4 Cultural Impact Assessment

[This page intentionally left blank]

**A CULTURAL IMPACT ASSESSMENT OF
THE KAPAHI BRIDGE (STATE SITE 50-30-08-2157)
BRIDGE NUMBER 007460021146001
KAPAA HOMESTEADS 1 SERIES, KAPA`A AHUPUA`A,
KAWAIHAU DISTRICT, KAUA`I ISLAND, HAWAII
[TMK: (4) 4-6-004]**

Prepared by:
Cathleen A. Dagher, B.A.
and
Michael F. Dega, Ph.D.
April 2012
DRAFT

Prepared for:
KAI Hawaii, Inc.
31 N. Pauahi Street, 2nd Floor
Honolulu, HI 96817

TABLE OF CONTENTS

TABLE OF CONTENTS.....	ii
LIST OF FIGURES	iii
INTRODUCTION	1
METHODOLOGY	5
ARCHIVAL RESEARCH	7
INTERVIEW METHODOLOGY	7
PROJECT AREA AND VICINITY	7
ENVIRONMENTAL SETTING	8
LOCATION	8
CLIMATE.....	9
PAST POLITICAL BOUNDARIES	9
TRADITIONAL AND HISTORIC SETTING.....	9
TRADITIONAL SETTLEMENT PATTERNS	10
TRADITIONAL SETTING.....	10
TRADITIONAL LAND TENURE.....	11
HISTORIC SETTING	12
THE MĀHELE	13
THE PLANTATION-ERA.....	14
ARCHAEOLOGY	17
KAPAHI BRIDGE STATE SITE 50-30-08-2157)	17
CONSULTATION.....	23
CULTURAL IMPACT ASSESSMENT INQUIRY RESPONSES	23
SUMMARY	27
CULTURAL ASSESSMENT AND RECOMMENDATIONS	28
REFERENCES	30
APPENDIX A: PLAN VIEW DRAWINGS OF PROPOSED KAPAHI BRIDGE REPLACEMENT OPTIONS.....	A
APPENDIX B: EXAMPLES OF INITIAL LETTER ENQUIRIES	B
APPENDIX C: LEGAL NOTICES	C
APPENDIX D: EXAMPLES OF FOLLOW-UP LETTERS OF INQUIRIES	D

LIST OF FIGURES

Figure 1: USGS Quadrangle (Kapaa 1996) Map Showing Locations of Project Area and State Site 50-30-08-2157. 2

Figure 2: Tax Map Key [TMK: (4) 4-6-004] Showing Locations of Project Area and State Site 50-30-08-2157. 3

Figure 3: Photograph of Kapahi Bridge (State Site 50-30-08-2157), East side of Kapahi Bridge with County of Kauai Department of Water Pipes. View to the North. (Note: Jeep is parked at approximate location of the new bridge). 18

Figure 4: Photograph of Kapahi Bridge (State Site 50-30-08-2157). View to North. 19

Figure 5: Photograph of Kapahi Bridge (State Site 50-30-08-2157). View to West. 20

Figure 6: Photograph of Kapahi Bridge (State Site 50-30-08-2157). View to South. 21

INTRODUCTION

At the request of KAI Hawaii, Inc., Scientific Consultant Services, Inc. (SCS), prepared a Cultural Impact Assessment (CIA) for approximately 1 acre of land on and around the Kapahi Bridge complex in Kapa`a Homesteads Series 1, Kapa`a Ahupua`a, Kawaihau District, Kaua`i Island, Hawai`i [TMK: (4) 4-6-004] (Figures 1 and 2). The CIA was conducted in preparation for the Kapahi Bridge Replacement Project. Plan view drawings of the proposed Kapahi Bridge replacement options are presented in Appendix A.

The Constitution of the State of Hawai`i clearly states the duty of the State and its agencies is to preserve, protect, and prevent interference with the traditional and customary rights of native Hawaiians. Article XII, Section 7 (2000) requires the State to “protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by *ahupua`a* tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778.” In spite of the establishment of the foreign concept of private ownership and western-style government, Kamehameha III (Kauikeaouli) preserved the peoples traditional right to subsistence. As a result in 1850, the Hawaiian Government confirmed the traditional access rights to Native Hawaiian *ahupua`a* tenants to gather specific natural resources for customary uses from undeveloped private property and waterways under the Hawaiian Revised Statutes (HRS) 7-1. In 1992, the State of Hawai`i Supreme Court, reaffirmed HRS 7-1 and expanded it to include, “native Hawaiian rights...may extend beyond the *ahupua`a* in which a native Hawaiian resides where such rights have been customarily and traditionally exercised in this manner” (Pele Defense Fund v. Paty, 73 Haw.578, 1992).

Act 50, enacted by the Legislature of the State of Hawai`i (2000) with House Bill (HB) 2895, relating to Environmental Impact Statements, proposes that:

...there is a need to clarify that the preparation of environmental assessments or environmental impact statements should identify and address effects on Hawaii’s culture, and traditional and customary rights... [H.B. NO. 2895].

Articles IX and XII of the state constitution, other state laws, and the courts of the State impose on government agencies a duty to promote and protect cultural beliefs and practices, and resources of native Hawaiians as well as other ethnic groups. Act 50 also requires state agencies and other developers to assess the effects of proposed land use or shore line developments on the

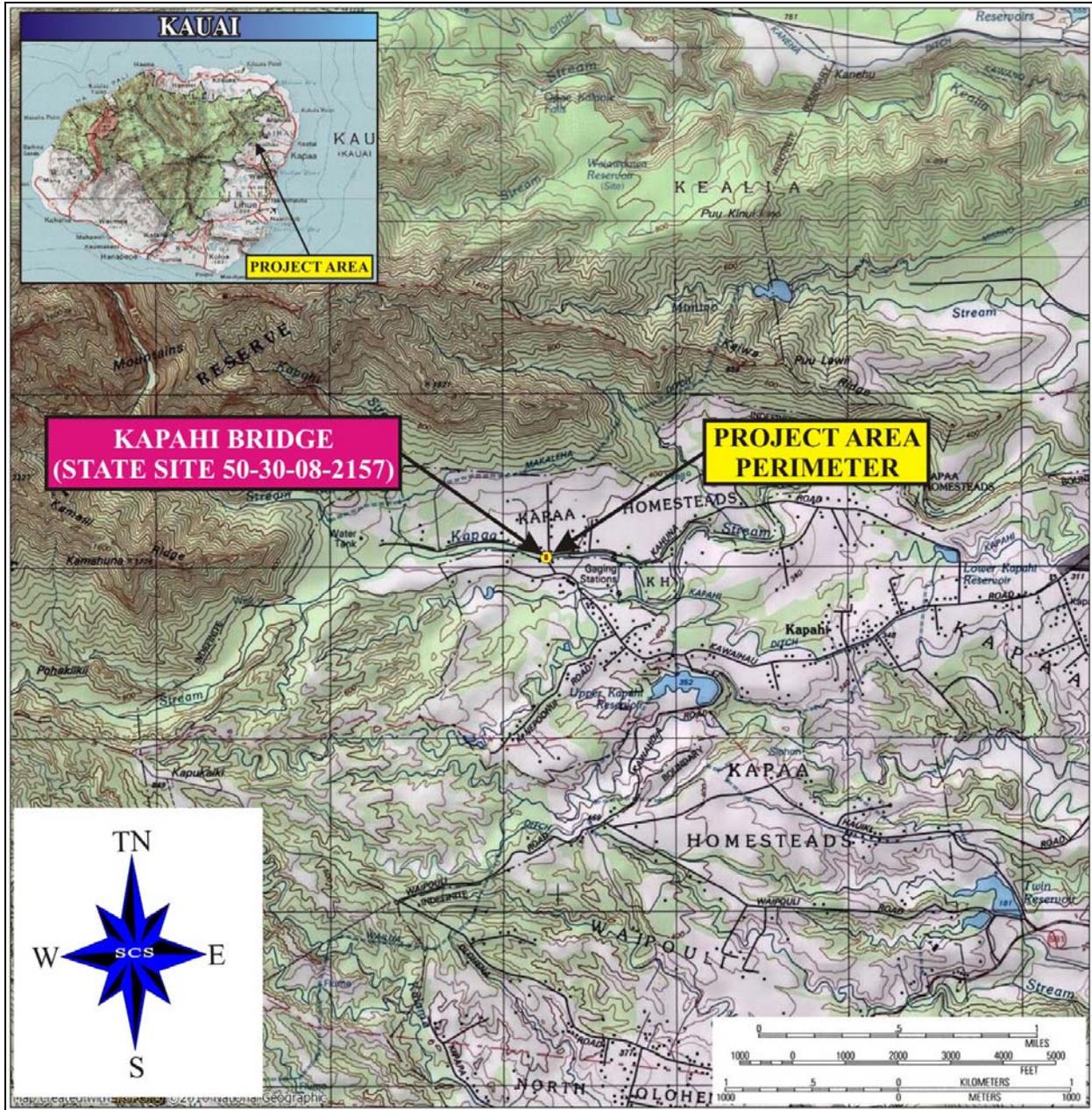


Figure 1: USGS Quadrangle (Kapaa 1996) Map Showing Locations of Project Area and State Site 50-30-08-2157.

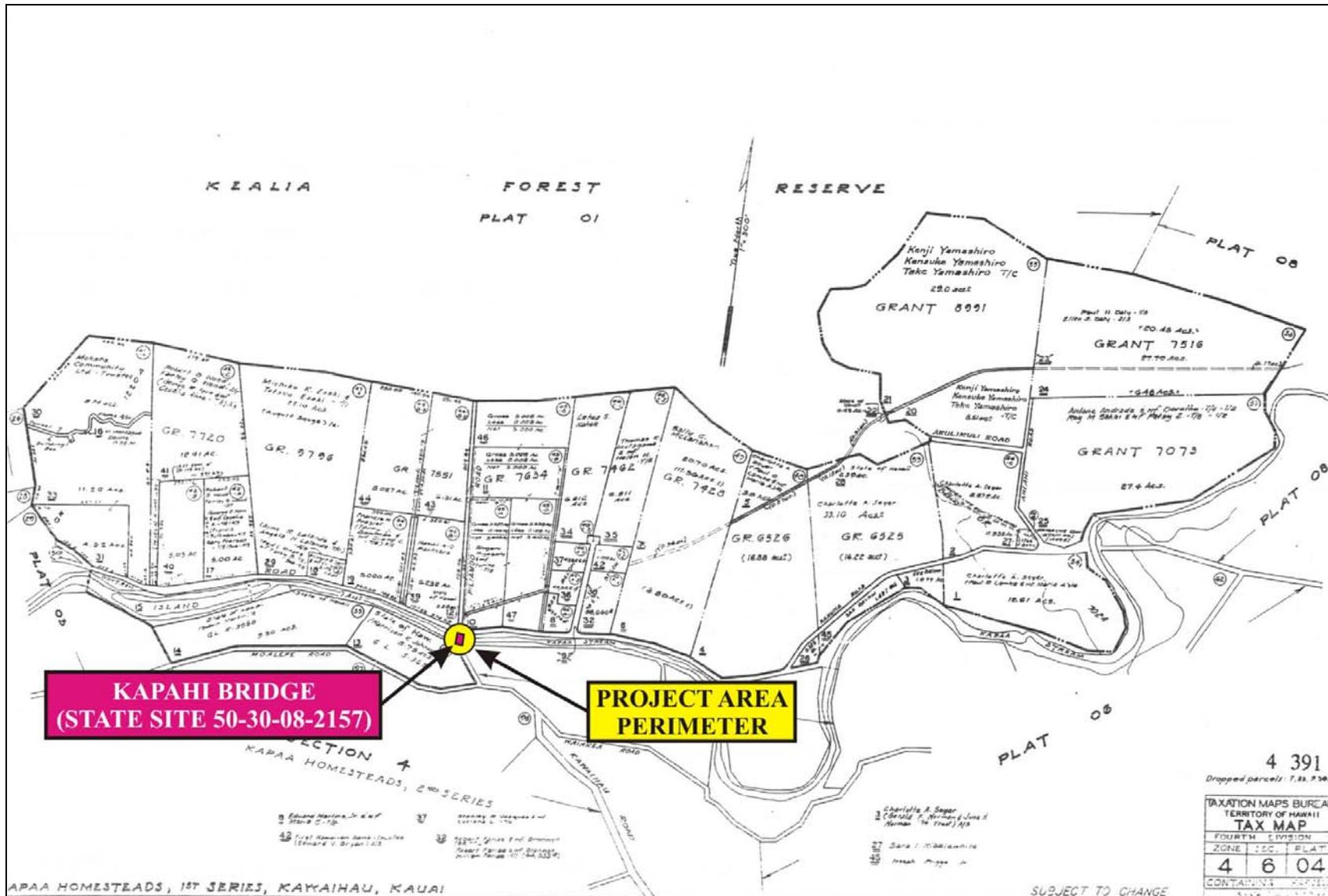


Figure 2: Tax Map Key [TMK: (4) 4-6-004] Showing Locations of Project Area and State Site 50-30-08-2157.

“cultural practices of the community and State” as part of the HRS Chapter 343 (2001) environmental review process.

It also re-defined the definition of “significant effect” to include “the sum of effects on the quality of the environment including actions impact a natural resource, limit the range of beneficial uses of the environment, that are contrary to the State’s environmental policies . . . or adversely affect the economic welfare, social welfare or cultural practices of the community and State” (H.B. 2895, Act 50, 2000). Cultural resources can include a broad range of often overlapping categories, including places, behaviors, values, beliefs, objects, records, stories, etc. (H.B. 2895, Act 50, 2000).

Thus, Act 50 requires that an assessment of cultural practices and the possible impacts of a proposed action be included in Environmental Assessments and Environmental Impact Statements, and to be taken into consideration during the planning process. As defined by the Hawaii State Office of Environmental Quality Control (OEQC), the concept of geographical expansion is recognized by using, as an example, “the broad geographical area, e.g. district or *ahupua`a*” (OEQC 1997). It was decided that the process should identify ‘anthropological’ cultural practices, rather than ‘social’ cultural practices. For example, *limu* (edible seaweed) gathering would be considered an anthropological cultural practice, while a modern-day marathon would be considered a social cultural practice.

Therefore, the purpose of a Cultural Impact Assessment is to identify the possibility of on-going cultural activities and resources within a project area, or its vicinity, and then assessing the potential for impacts on these cultural resources. The CIA is not intended to be a document of in depth archival-historical land research, or a record of oral family histories, unless these records contain information about specific cultural resources that might be impacted by a proposed project.

According to the Guidelines for Assessing Cultural Impacts established by the Hawaii State Office of Environmental Quality Control (OEQC 1997):

The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religions and spiritual customs. The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both manmade and natural, which support such cultural beliefs.

The meaning of “traditional” was explained in *National Register Bulletin*:

Traditional” in this context refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations’, usually orally or through practice. The traditional cultural significance of a historic property then is significance derived from the role the property plays in a community’s historically rooted beliefs, customs, and practices. . . . [Parker and King 1990:1]

METHODOLOGY

This Cultural Impact Assessment was prepared as much as possible in accordance with the suggested methodology and content protocol in the Guidelines for Assessing Cultural Impacts (OEQC 1997). In outlining the “Cultural Impact Assessment Methodology”, the OEQC states that:

“...information may be obtained through scoping, community meetings, ethnographic interviews and oral histories...”

This report contains archival and documentary research, as well as communication with organizations having knowledge of the project area, its cultural resources, and its practices and beliefs. Copies of the letters of inquiry are presented below in Appendix B; copies of posted legal notices are presented in Appendix C; copies of the second group of letters of inquiry are presented below in Appendix D; and responses to the inquiries are presented in the Response to Inquires section of this document and selected responses are presented in Appendix E. This Cultural Impact Assessment was prepared in accordance with the suggested methodology and content protocol provided in the Guidelines for Assessing Cultural Impacts (OEQC 1997), whenever possible. The assessment concerning cultural impacts may include, but not be limited to, the following matters:

- (1) if consultation is available, a discussion of the methods applied and results of consultation with individuals and organizations identified by the preparer as being familiar with cultural practices and features associated with the project area, including any constraints or limitations which might have affected the quality of the information obtained;
- (2) a description of methods adopted by the preparer to identify, locate, and select the persons interviewed, including a discussion of the level of effort undertaken;

- (3) if conducted, interview procedures, including the circumstances under which the interviews were conducted, and any constraints or limitations which might have affected the quality of the information obtained;
- (4) biographical information concerning the individuals and organizations consulted, their particular expertise, and their historical and genealogical relationship to the project area, as well as information concerning the persons submitting information or being interviewed, their particular knowledge and cultural expertise, if any, and their historical and genealogical relationship to the project area;
- (5) a discussion concerning historical and cultural source materials consulted, the institutions and repositories searched, and the level of effort undertaken, as well as the particular perspective of the authors, if appropriate, any opposing views, and any other relevant constraints, limitations or biases;
- (6) a discussion concerning the cultural resources, practices and beliefs identified, and for the resources and practices, their location within the broad geographical area in which the proposed action is located, as well as their direct or indirect significance or connection to the project site;
- (7) a discussion concerning the nature of the cultural practices and beliefs, and the significance of the cultural resources within the project area, affected directly or indirectly by the proposed project;
- (8) an explanation of confidential information that has been withheld from public disclosure in the assessment;
- (9) a discussion concerning any conflicting information in regard to identified cultural resources, practices and beliefs;
- (10) an analysis of the potential effect of any proposed physical alteration on cultural resources, practices, or beliefs; the potential of the proposed action to isolate cultural resources, practices, or beliefs from their setting; and the potential of the proposed action to introduce elements which may alter the setting in which cultural practices take place, and;
- (11) the inclusion of bibliography of references, and attached records of interviews which were allowed to be disclosed.

If on-going cultural activities and/or resources are identified within the project area, assessments of the potential effects on the cultural resources in the project area and recommendations for mitigation of these effects can be proposed.

ARCHIVAL RESEARCH

Archival research focused on a historical documentary study involving both published and unpublished sources. These included legendary accounts of native and early foreign writers; early historical journals and narratives; historic maps, land records, such as Land Commission Awards, Royal Patent Grants, and Boundary Commission records; historic accounts, and previous archaeological reports.

INTERVIEW METHODOLOGY

Interviews are conducted in accordance with Federal and State laws, and guidelines, when knowledgeable individuals are able to identify cultural practices in, or in close proximity to, the project area. If they have knowledge of traditional stories, practices and beliefs associated with a project area or if they know of historical properties within the project area, they are sought out for additional consultation and interviews. Individuals who have particular knowledge of traditions passed down from preceding generations and a personal familiarity with the project area are invited to share their relevant information concerning particular cultural resources. Often people are recommended for their expertise, and indeed, organizations, such as Hawaiian Civic Clubs, the Island Branch of Office of Hawaiian Affairs (OHA), historical societies, Island Trail clubs, and Planning Commissions are depended upon for their recommendations of suitable informants. These groups are invited to contribute their input, and suggest further avenues of inquiry, as well as specific individuals to interview. It should be stressed again that this process does not include formal or in-depth ethnographic interviews or oral histories as described in the OEQC's *Guidelines for Assessing Cultural Impacts* (1997). The assessments are intended to identify potential impacts to on-going cultural practices, or resources, within a project area or in its close vicinity.

If knowledgeable individuals are identified, personal interviews are sometimes taped and then transcribed. These draft transcripts are returned to each of the participants for their review and comments. After corrections are made, each individual signs a release form, making the interview available for this study. When telephone interviews occur, a summary of the information is usually sent for correction and approval, or dictated by the informant and then incorporated into the document. If no cultural resource information is forthcoming and no knowledgeable informants are suggested for further inquiry, interviews are not conducted.

PROJECT AREA AND VICINITY

The project area lies within Kapa`a Ahupua`a, in Kawaihau District on the eastern flank of the island of Kaua`i, at c. 400 feet amsl. The area surveyed measured c. 1-acre. Kapa`a is one of ten *ahupua`a* located in the area known as Puna Moku during traditional times (Handy and

Handy 1972:423). The project area and environs occur in the Kapaa Homesteads, which were opened in 1913.

The Kapahi Bridge carries Kawaihau Road over Moalepe Stream, a general west to east trending stream. According to Handy and Handy (1972:423), the Kapa`a Stream is formed by the confluence of Kapahi, Makaleha, and Moalep(i) Streams. The current project area, inclusive of the bridge itself, Moalepe Stream, and adjacent lands bordering the stream and bridge access points, have undergone numerous modifications in the past, including the bridge construction and road construction.

Neighboring roads include Kahuna Road to the north and Moalepe Road to the south. The northern and southern flanks of the bridge are adjacent to existing residences with lawns. The area surveyed for this study included lands around all cardinal points of the bridge, up to approximately one acre.

ENVIRONMENTAL SETTING

LOCATION

Kaua`i, the oldest and fourth largest of the eight main Hawaiian Islands (with land area equaling approximately 1,432 square kilometers), was formed from one great shield volcano (Macdonald and Abbott 1970:458-461). At one time, this vast volcano supported the largest caldera in the islands, horizontally extending 15 to 20 kilometers across. Mount Wai`ale`ale, which forms the central hub of the island, extends 1,598 meters above mean sea level (amsl). Topographically, Kaua`i is a product of heavy erosion with broad, deep valleys, and large alluvial plains.

Typical soils encountered in the general project area are associated with the Kapaa Series, specifically Kapaa silty clay (KkB) (Foote *et al.* 1972: Sheet Map 29). The Kapaa Series consists primarily of alluvial-washed silty clays. These are well-drained soil on Kaua`i uplands and occur on gentle to extreme slopes. Elevations for this series range from 200 feet to 500 feet amsl. Annual rainfall amounts associated with this series are estimated at 80 to 120 inches. The KkB soils occur on broad ridges and are of igneous origin. The KkB soils exhibit moderate permeability, slow runoff, and a slight erosion hazard. These soils are also associated with various forms of historic cultivation (sugarcane, pineapple, orchards, truck farming) as well as for ranchlands and water supply (Foote *et al.* 1972:61-62).

CLIMATE

The project area is relatively wet, with mean annual rainfall ranging from 40 to 120 inches annually (Armstrong 1983; Giambelluca *et al.* 1986). During the pre-Contact Period, a great amount of fresh water would have been locally available in the numerous streams that drain Mt. Wai`ale`ale. Annual air temperatures in the area vary from approximately 50 to 83 degrees (Armstrong 1983).

PAST POLITICAL BOUNDARIES

Approximately 600 years ago, the Hawaiian population had expanded throughout the Hawaiian Islands to a point where large, political districts could be formed (Lyons 1903; Kamakau 1991; Moffat and Fitzpatrick 1995). At that time, Kaua`i consisted of six districts, or *moku*: East and West Kona, Puna, Ko`olau, Halele`a, and Nāpili. Land was considered to be the property of the king or *ali`i `ai moku* (the leader who controls the island/district), which he held in trust for the gods. The title of *ali`i `ai moku* ensured rights and responsibilities to the land, but did not confer absolute ownership. The king kept the parcels he wanted; his higher chiefs received large parcels from him, and in turn, distributed smaller parcels to lesser chiefs. The *maka`āinana* (commoners) worked the individual plots of land.

In general, several terms, such as *moku*, *ahupua`a*, *`ili* or *`ili`āina* were used to delineate various land sections. A district (*moku*) contained smaller land divisions (*ahupua`a*) that customarily continued inland from the ocean and upland into the mountains. Extended household groups living within the *ahupua`a* were, therefore, able to harvest from both the land and the sea. Ideally, this situation allowed each *ahupua`a* to be self-sufficient by supplying the needed resources from different environmental zones (Lyons 1875:111). The *`ili* or *`ili`āina* were smaller land divisions next in importance to the *ahupua`a* and were administered by the chief who controlled the *ahupua`a* in which it was located (Lyons 1875:33; Lucas 1995:40). The *mo`o`āina* were narrow strips of land within an *`ili*. The land holding of a tenant or *hoa`āina* residing in an *ahupua`a* was called a *kuleana* (Lucas 1995:61).

TRADITIONAL AND HISTORIC SETTING

Archaeological settlement pattern data indicates that initial colonization and occupation of the Hawaiian Islands first occurred on the windward shoreline areas around c. A.D. 900, with populations eventually settling into drier leeward areas at later periods (Kirch 1985). Coastal settlement was still dominant, but populations began exploiting and living in the upland *kula* (plains) zones. Greater population expansion to inland areas did not occur until around the A.D.

12th century and continued through the 16th century. Large scale or intensive agricultural endeavors were implemented in association with habitation. Coastal lands were used for settlement and taro was cultivated in near-coastal reaches and in the uplands.

TRADITIONAL SETTLEMENT PATTERNS

The Hawaiian economy was based on agricultural production and marine exploitation, as well as raising livestock and collecting wild plants and birds. Extended household groups settled in various *ahupua`a*. During pre-Contact times, there were primarily two types of agriculture, wetland and dry land, both of which were dependent upon geography and physiography. River valleys, such as those on Kaua`i, provided ideal conditions for wetland *kalo* (*Colocasia esculenta*)—agriculture that incorporated pond fields and irrigation canals (*`auwai*). Other cultigens, such as *kō* (sugarcane, *Saccharum officinarum*), *mai`a* (banana, *Musa sp.*), and *`uala* (sweet potato, *Ipomoea batatas*) were also grown. This was the typical agricultural pattern seen during traditional times on all the Hawaiian Islands (Kirch and Sahlins 1992, Vol. 1:5, 119; Kirch 1985). Agricultural development on Kaua`i was likely to have begun early (A.D. 1100–1300), during what is known as the Expansion Period (Kirch 1985). Coastal zones were utilized for marine resources, habitation, burials, and ceremonial structures often associated with fishing (Bennett 1931). Often, land sections located in back of the shoreline contained pond fields and dunes that were used for sweet potato production (Handy and Handy 1972; Earle 1978). Trails linked the *makai* and *mauka* sections of the *ahupua`a*, allowing easy access to its resources. Other trails skirted the coast, which made communication between *ahupua`a* possible.

TRADITIONAL SETTING

Kaua`i is the fourth largest and the oldest of the main Hawaiian Islands. It is said that many years ago, the fire goddess Pele and her family briefly stopped on Kaua`i to explore the possibility of finding a permanent home. She dug a deep pit, but it was instantly filled with water, so they left Kaua`i and traveled on, and eventually settled in Halema`uma`u, on the island of Hawai`i, where she resides to this day (Beckwith 1976).

Despite Kaua`i Island's separation from the rest of the Hawaiian archipelago (the channel that separates Kaua`i and Ni`ihau from O`ahu is 63 miles wide), the rich variety of topography and climate has been extremely influential in establishing broad settlement patterns (Bennett 1931:4). The varied ecological division of the island, which contains verdant cliffs, dry and sandy flats, wide river valleys and tracts of fertile soil, provided the opportunities for a wide variety of cultivation.

Handy and Handy (1972:423) note that the inland portion of Puna District (Kawaihau) contains a number of small streams along which small *lo`i* were developed. The *ahupua`a* of Kapa`a has been described as a broad, wide, and deep kula land containing small ridges and valleys inland and two small streams (Handy and Handy 1972:23). Handy and Handy (1972:423) go on to say that "...there was a highly developed irrigation system at Kapa`a..." with "...extensive flatlands located below the mountains with terraces irrigated from Kapahi, Makaleha, and Moalepi Streams" Bennett (1931:128) states that in the homestead area, many little valleys contain taro terraces. Further, below the mountains, there were extensive flatlands where agricultural terraces irrigated by such streams as Kapahi were located (Bennett 1931:128). The terraces were described as "Single rows of stone mark the divisions with some 2-foot terraces" and designated as Bennett's Site 110 (State Site 50-30-08-110) (Bennett 1931:128). This is also the location of the upper homesteads (Kapaa Homesteads). Bennett's Site 111 (State Site 50-30-08-111), as described by Bennett (1931:128-129) and also occurring in the area (inland and south of Kealia Valley), consisted of a "simple dirt ditch, about 6 feet in width and of varying depths which is traditionally referred to as a Hawaiian ditch."

During the pre-Contact period (prior to 1778), this upper region was marginally settled but contained excellent land for agriculture, it being a product of alluvial deposition from all the streams in the area. Impressive irrigation systems were built on Kaua`i to transport stream water to agricultural fields during traditional times (Handy and Handy 1972; Earle 1978). In 1892, Dole (1916) reported that these ancient agricultural resources of eastern Kaua`i were still functioning, as evident by the extensive ditch irrigation system throughout Wahiawa, Kapa`a, and Kilauea.

Handy and Handy (1972: 424) state that Kapa`a "is famous as the home of the great *ali`i* Mo`ikeha who lived there in his later years." It was also the home of the boy Pāka`a, who lived there with his mother and uncle. Pāka`a longed to go with the fishermen who caught his favorite food (*mālolo*, flying fish), but they always refused his pleas. So, Pāka`a invented the crab-clawed sail and challenged the fishermen to a race, betting that whoever reached the shore first could keep the day's catch. Pāka`a won the race and that night he and his family had all the *mālolo* they could eat (Wichman 1998:85).

TRADITIONAL LAND TENURE

According to Kamakau (1964), traditional Hawaiian land tenure was a system formed in order to care for the land. Around the 14th century, various individual island *mo`i* (ultimate ruler) believed the land should be surveyed as to be permanently marked. The land system was needed

to avoid disputes between neighboring *ali`i* (chiefs). A *kahuna* (priest/expert) named Kālaika`ōhia is said to have carved the land into districts (*moku*) and numerous smaller divisions (i.e., *ahupua`a*, *okana*, *ili* etc.) were also coordinated.

The idea of holding land was not synonymous with owning it, but more like a trusteeship between the caretakers and the nature gods Lono and Kane (Handy and Handy 1972:41). The *ahupua`a* is the most well known of all traditional land divisions and is still relevant today.

The *ahupua`a* land divisions vary in size and generally encompass land from the mountain to the sea. Traditionally, the areas were governed by a designated caretaker (*konohiki*) and those residing within the region had designated access to all mountain and marine resources. Chinen (1958:5) explains that all chiefs and commoners were entitled to a portion of the mountain and marine resources.

HISTORIC SETTING

The first recorded Western contact in the Hawaiian Islands was made in 1778 on the southern coast of Kaua`i (Beaglehole 1967). Waimea was the port of call for many years, leaving the rest of Kaua`i an uncharted territory. Portlock and Dixon visited Waimea in 1786 and in 1787 and John Meares also stopped on his way to Canton, China, in 1787 (Joesting 1987:44). Captain William Douglas sent two sailors ashore in Waimea to collect sandalwood in 1789, and in 1791, Captain John Kendrick left three men on Ni`ihau to look for pearls and sandalwood. There is no description of the eastern coast until Captain George Vancouver traveled up the coast from Wailua in 1793. As there was no anchorage, he sailed towards Kapa`a, noting that this was: "...the most fertile and pleasant district of the island..." (Joesting 1987:50).

Much of the knowledge of traditional land use patterns is based on what was recorded at the time of, and shortly after, Western contact. Early records, such as journals kept by travelers and missionaries or Hawaiian traditions that survived long enough to be written down, assist in understanding the past. Protestant missionaries arrived in Hawai`i in April of 1820 and by the end of the year, were settled on Kaua`i. In 1830, as part of the missionary report, a census of individuals living in the *ahupua`a* around the islands was recorded (Schmitt 1973). We are limited to traveler`s journals for information concerning descriptions of the general Wailua region.

In 1849, William Patterson Alexander landed at Koloa, Kaua`i where he was to embark over land to the mission houses in Wai`oli:

May 5. This morning we rose early....A few miles from Wailua, near Kapaa we passed the wreck of a schooner on the beach, which once belonged to Capt. Bernard. It was driven in a gale over the reef, and up on the beach, where it now lies. A few miles further we arrived at Kealia. We had some difficulty in crossing the river at this place, owing to the restiveness of our horses. The country here near the shore was rather uninviting, except the valleys which always contained streams of water....The two peaks of Anahola are quite a landmark to one traveling in this region....[Alexander cited in Kaua`i Historical Society 1991:123].

On his return to Koloa, Alexander traveled back through Keālia:

...Five miles from Anahola we stopped at Kealia, a picturesque valley containing a beautiful waterfall, to bathe & rest our horses. In leaving the valley, I unfortunately left my spur, & did not think of it till we had ridden nearly a mile. I rode back for it and found it, determined to lose nothing on Kauai by carelessness [Alexander cited in Kaua`i Historical Society 1991:129].

Although no people are mentioned, it can be assumed they were there, perhaps more inland, tending to lands worked by their families for generations.

THE MĀHELE

In the 1840s, traditional land tenure shifted drastically with the introduction of private land ownership based on Western law. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kamehameha III was forced to establish laws changing the traditional Hawaiian economy to that of a market economy (Kuykendall 1938 Vol. I:145; Daws 1968:111; Kelly 1983:45, 1998:4; Kame`eleihiwa 1992:169-70, 176). The Māhele of 1848 divided Hawaiian lands between the king, the chiefs, the government, and began the process of private ownership of lands. The subsequently awarded parcels were called Land Commission Awards (LCAs). Once lands were made available and private ownership was instituted, the *maka`āinana* (commoners) were able to claim the plots on which they had been cultivating and living, if they had been made aware of the procedures. These claims did not include any previously cultivated but presently fallow land, *`okipū* (on O`ahu), stream fisheries, or many other resources necessary for traditional survival (Kelly 1983; Kame`eleihiwa 1992:295; Kirch and Sahlins 1992). If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA and issued a Royal Patent after which they could take possession of the property (Chinen 1961:16).

The current bridge location does not itself fall into any LCA's or land grants. However, there are adjacent lands which are demarcated as land grants and land court applications. A majority of these inland claims were associated with streams, where wetland *kalo* (taro) was produced and house sites were scattered about the agricultural area.

THE PLANTATION-ERA

As stated above, commercial sugarcane agriculture came to Keālia during the middle to late 19th century. According to Dorrance and Morgan (2000), the Kealia Sugar Plantation was in operation from 1869 until 1885. The Makee Sugar Company ran from 1877 until 1933.

George H. Fairfield, general manager of the Makee Sugar Company, employed the “divide and rule strategy” by hiring a labor force consisting of multinationals which provided for stable work force with little division (Takaki 1983:24). Plantation life for the workers could be very harsh; when it came to production, workers were treated little better than slaves (*ibid*: 74).

Around this time (1865), William T. Brigham, future curator of the Bishop Museum, toured Kaua`i on horseback, passing through the inland area on his way to Keālia:

...After riding through several kukui groves, and over pleasant ridges we came to Kealia, the residence of Mr. Krull. Here I lunched at two o'clock. Many kukui trees were covered with dodder. A few miles beyond we passed a Golgotha, and as we turned towards the shore again, saw a curious hole in the ridge [Anahola Mts] which comes to an abrupt end here. [Brigham in Kaua`i Historical Society 1991:142].

A landing had been built in Kapa`a during the plantation's early years, making Keālia one of the four ports or landings with scheduled steamer calls. The Valley House mansion was built by Colonel Z. S. Spalding in 1880 near the boundary of Kapa`a and Keālia; with the continued success of the sugar crops, he subsequently dismantled and moved the Kapa`a Mill to Keālia in 1885. Condè and Best (1973) suggest that railroad construction for the Makee Plantation started just prior to the 1890s. Eventually, the railroad line was part of a twenty-mile network which included portable track along a portion of Keālia Valley and the *mauka* regions on the plateau lands north of Keālia. In 1910, their rolling stock consisted of 400 can cars and three locomotives (Condè and Best 1973). The old Government road, or Mauka Road, crossed Keālia River above a rice plantation and passed over the hill near Colonel Spalding's home. At the beginning of the 20th Century, a new road was built which after crossing the river at the *makai* end of Keālia Stream, paralleled the ocean and the railroad track, and then turned *mauka*

passing through Keālia Town to meet up with the old Government Road (Bushnell *et al.* 2002). Around 1912, the Keālia Bridge, which traversed Keālia Stream, was built of steel.

Having already been successful with sugarcane on Maui, Captain James Makee started his third sugar venture with King Kalākaua on Kauaʻi. James Makee had been in the islands since 1843, when an unfortunate incident involving a deranged cook on the whaler *Maine* en route from Lāhainā to Honolulu, attacked him with a cleaver. As a result, he was forced to spend a period of recuperation in Honolulu (Dorrance and Morgan 2000:31). In spite of this rather violent introduction, Captain Makee was quite taken with Hawaiʻi and while recovering sent for his family on the east coast with the intention of settling in the islands. After developing a successful trading business in Honolulu, Captain Makee purchased the defunct Torbert plantation and mill in ʻUlupalakua on Maui. In 1876 he broadened his sugar domain by purchasing a partnership in Waiheʻe Sugar Company and by 1878, had become its sole owner. In 1876, Krull sold his ranch to Colonel Spalding and Makee.

The Keālia Plantation began as a partnership between Makee and King Kalākaua with the purchase of Krull's Kapaʻa dairy in 1877. Not only Kalākaua joined Makee in this east Kauaʻi sugar venture, but the Hui Kawaihau, which was made up of prominent associates of the king, became a part of the enterprise (Bushnell *et al.* 2002). Makee was given land in Kapaʻa for a mill and he agreed to grind cane supplied by the Hui members. Kalākaua also established a new district in Kauaʻi (Kawaihau) that included all of the land between Wailua and Moloaʻa, where the Hui could cultivate their crops. Sugar was milled for four years, but after a fire destroyed half of their crop and the sudden death of Captain Makee, the Hui began to dissolve and the leasehold rights passed on to Makee's son-in-law and the new plantation owner, Colonel Spalding (Dole 1916). In 1885, the company relocated to Spalding's plantation in Keālia, where it generated a thriving community. This community included a post office, reservoirs, a landing, a theater, and railway connections to nearby Anahola and to Līhuʻe, and seven plantation camps. The plantation camps were established mostly in the Kumukumu ʻili. The camps were given meaningful names which distinguished immigrant groups or site locations. Yaki Camp was for Japanese immigrants, Chong for the Chinese. New Stable Camp, Old Stable Camp, Mimino Camp, Amberry Camp, and Halaula Camp were other camps which were on the Makee Plantation.

In July of 1895, Eric Knudsen spent sometime traveling around the island of Kauai noting:

On we went; no time to stop. The Kealia Sugar Co's cane fields came into view. The sleeping giant was on our left-the sand dunes on our right. The next village was Kapaa-only a small place-and riding around a bluff called Kaiakea we came in view of the Kealia Mill. Here was the domain of Col. Z.S. Spalding. I had met him many years before when I was a little boy and he had come to buy sheep from my father [Brigham in Kauai Historical Society 1991:152].

Along with the growth of sugar plantations, there was an influx of immigrants initially from China, Japan, and Portugal. By the late 1800s, the Makee Plantation alone was employing more than one thousand workers (Cook 1999). John Rapoza arrived in 1883 on the S.S. James Makee from Portugal:

...I was then twenty-one years of age and with my parents. The trip from Honolulu to Kapaa was made in the usual time of 15 hours, but it was for worse than the 60-day trip we made from Europe. I was under a three-year contract to work on the plantation. We Received \$9 a month for our work and \$8 a month for "kaukau". Originally, the sugar from Kealia was sent to Kapaa in wagons drawn by California horses. The railroad track was made from Kealia Mill to Kapaa Landing about 1886. I drove the horses or mules on these cars. Two small locomotives were bought about 1890. The steamer James Makee could take 2500 bags of sugar. The Kaala took 2000 bags [*The Garden Island*, August 18, 1978]

As was the policy, a school, stores, and other necessities were provided by the plantation and a town quickly materialized on the plain around the mill. The first school, Kapa`a English School, was built in 1883 on Ka`ahi`ahi point adjacent to the Makee Company railroad and a church appeared in 1887. In 1908 the church was moved to its present location on Kawaihau Road.

In the early 1940s, pineapple was grown in fields, in Keālia, at an elevation of 360 feet above mean sea level and sugarcane continued to be cultivated below the belt road. However, with the arrival of World War II and the military take over of the Spalding estate, things changed:

Various structures were built including four barracks, a large warehouse, a garage and a bomb shelter and an ammunition tunnel in the side of a hillside [Parks 1985:8].

East Kauai Water Company (EKW) was established in 1924 with jurisdiction over the waters that arise in and cross through state lands. EKW waters are all the flows of the North Fork of the Wailua River, the Kapa`a and Anahola Rivers and their tributaries, and such waters of Hanalei River and Kaapoiko stream that are diverted into the North Wailua drainage basin. The EKW ditch system runs for 34 miles of which 101 tunnels comprise 11 miles (Wilcox 1996:69).

By the mid-Twentieth Century, many of the homesteaders in the area, who had grown sugarcane and pineapple for the larger companies, were occupied in fields other than agriculture, and the homesteads became more residential in nature.

ARCHAEOLOGY

Previous archaeological investigations have not been conducted in the current project area. Scientific Consultant Services, Inc, recently conducted an Archaeological Inventory Survey on approximately 1 acre on and around the Kapahi Bridge complex in Kapa`a Homesteads Series 1, Kapa`a Ahupua`a, Kawaihau District, Kaua`i Island, Hawai`i [TMK: (4) 4-6-004] (Dagher and Dega 2012). The study was conducted as a portion of the multidisciplinary study pertaining to the placement of the Kapahi Bridge Replacement Project. During the Archaeological Inventory Survey, only one site, the historic Kapahi Bridge (State Site 50-30-08-2157), was identified.

KAPAHI BRIDGE STATE SITE 50-30-08-2157

Kapahi Bridge (State Site 50-30-08-2157) is a one-lane bridge remains in its original location carrying Kawaihau Road over Moalepe Stream (see Figures 3 through 6). The Kapahi Bridge exhibits a single 36-foot span, with a total length of 38 feet, and the height of the soffit of the bridge above the stream-bed measures approximately 9 feet. The Kapahi Bridge has undergone several design modifications over the years. The following summary material is based on historic records and summaries previously researched by Spencer Mason Architects (1989).

Although construction may have occurred at an earlier date, the Kapahi Bridge is believed to have been constructed in 1937 (Tonia Moy, Fung and Associates, personal communication). According to Wilson Okamoto & Associates (in Spencer Mason Architects 1989), the current bridge “replaced a three-span, timber stringer bridge.” Spencer Mason Architects (1989) state that:



Figure 3: Photograph of Kapahi Bridge (State Site 50-30-08-2157), East side of Kapahi Bridge with County of Kauai Department of Water Pipes. View to the North. (Note: Jeep is parked at approximate location of the new bridge).



Figure 4: Photograph of Kapahi Bridge (State Site 50-30-08-2157). View to North.



Figure 5: Photograph of Kapahi Bridge (State Site 50-30-08-2157). View to West.



Figure 6: Photograph of Kapahi Bridge (State Site 50-30-08-2157). View to South.

No plans for [the Kapahi B]ridge were located in the County Department of Public Works, not even the plans for the 1997 repair(s)...[The Kapahi Bridge] may date from before 1937, if it is the same bridge that the County Engineer reported was being widened in October of that year. It was not built before 1907, as the map of Kapaa Homesteads in the State Survey Office was based on a worksheet from that year and does not show any bridge crossing Kapaa Stream in that location.

According to Spencer Mason Architects (1989) repairs were made to Kapahi Bridge in 1977. At that time some of the original building materials were replaced, with only the original abutments being retained. The original timber decking and piers, which were not removed, were replaced by steel girders. However, the southern pier, which had been subjected to flood damage, was removed. As the original wooden planks have become weathered and worn they have been replaced with steel planks.

Kapahi Bridge, and surrounding roads, provided an integral transportation link that led to the success of the homestead lands. Initially, homesteading was not thought as a highly viable venture by many in the government, most of the homestead lands being controlled (from c. 1913) by large businesses and the government. There was opposition to homesteads as some thought this simply a ploy for a land grab, which would remove the lands from the profitable sugarcane industry which the lands were farmed. By 1917, the Kapa`a homesteaders had soundly defeated that argument.

In all, Kapahi Bridge performed an elevated transportation and communication function for homesteaders during the Plantation Era. The bridge represents a strong relationship with early to mid-Twentieth Century land use in the Kapaa Homesteads area.

According to Spencer Mason (1989), the Kapahi Bridge has integrity in terms of original location (over Moalepe Stream). Kapahi Bridge has limited artistic value as exhibited in the geometrical white lines of the railing and the positioning of the sloping braces. However, the structural integrity of the Kapahi Bridge has been altered (Spencer Mason Architects 1989). While some of the original bridge components were retained, most of the components supporting the bridge have been replaced with steel. The steel stringer/multi-beam structural type is not unique, as there are other bridges on island which exhibiting the same structural type. As the date of construction has not been firmly established the Kapahi Bridge cannot be considered as a good example of a bridge associated with a specific time period. The bridge measures 38 feet in length with the height of the soffit by the 9 feet above the stream bed. These dimensions are considered to be relatively small and indicate the engineering of the Kapahi Bridge is not

considered to be complex. Thus, Kapahi Bridge has low integrity and is not considered eligible for the State or National Register of Historic Places.

CONSULTATION

Consultation was conducted via telephone, e-mail, and the U.S. Postal Service. Consultation was sought from Pat Griffin, historian; Andy Bushnell, historian; Ron Terry; Tonia Moy, historic architect of Fung Associates, Inc.; Allan Smith, community member; Kiersten Faulkner, Executive Director of the Hawaii Historic Foundation; Jan Tennbrugnengate, reporter; Cheryl Lovell-Obatake, community member and previous Kaua`i/Ni`ihau Island Burial Council Member; Spencer Leinweber, of Clever Construction; Clyde Nāmu`o, Director of the Office of Hawaiian Affairs (OHA); Dr. Abba G. Lichtenstein, Advisory Board Member of the Historic Bridge Foundation; Ms. Rayne Regush, Kapaa Community Neighborhood Board; Mr. Richard Pezzulo, Chief Operating Officer of the Office of Hawaiian Affairs, and Mr. Erik Burton, Operations Director at the Ethnobotany Research and Applications Journal. Note: On December 30, 2011, Mr. Clyde Nāmu`o resigned his position at the Department of Hawaiian Affairs.

In addition, a Cultural Impact Assessment Notice was published on December 14, 15, and 18, 2011, in *The Honolulu Star-Advertiser*, *The Garden Island*, which published on the same dates on Kaua`i, and the December issue of the OHA newspaper, *Ka Wai Ola* (see Appendix C). At the request of the client, Mike Hunnemann of KAI Hawaii, the legal notice for the *The Garden Island*, only, was revised and re-posted on January 18, 19, and 22, 2012 (see Appendix C).

These notices requested information of cultural resources or activities in the area of the proposed project, stated the TMK number, and where to respond with pertinent information. Based on the responses, an assessment of the potential effects on cultural resources in the project area and recommendations for mitigation of these effects can be proposed.

CULTURAL IMPACT ASSESSMENT INQUIRY RESPONSES

Analysis of the potential effect of the project on cultural resources, practices or beliefs, the potential to isolate cultural resources, maintain practices or beliefs in their original setting, and the potential of the project to introduce elements that may alter the setting in which cultural practices take place is a requirement of the OEQC (No. 10, 1997). As stated earlier, this includes the cultural resources of the different groups comprising the multi-ethnic community of Hawai`i.

As stated above, consultation was sought from Pat Griffin, historian; Andy Bushnell, historian; Ron Terry; Tonia Moy, Fung Associates, Inc.; Allan Smith, community member; Kiersten Faulkner, Executive Director of the Hawaii Historic Foundation; Jan Tennbrugnengate, reporter; Cheryl Lovell-Obatake, community member and previous Kaua`i/Ni`ihau Island Burial Council Member; Spencer Leinweber, of Clever Construction; Clyde Nāmu`o, Director of the Office of Hawaiian Affairs (OHA); and Dr. Abba G. Lichtenstein, Advisory Board Member of the Historic Bridge Foundation; Ms. Rayne Regush, Kapaa Community Neighborhood Board; Mr. Richard Pezzulo, Chief Operating Officer of the Office of Hawaiian Affairs, and Mr. Erik Burton, Operations Director at the Ethnobotany Research and Applications Journal. Summaries of the responses to the letters of inquiry are presented below and selected responses are presented in Appendix E

In addition, a Cultural Impact Assessment Notice was published on December 14, 15, and 18, 2011, in *The Honolulu Star-Advertiser*, *The Garden Island*, which published on the same dates, and December 2011 issue of the OHA newspaper, *Ka Wai Ola*. Follow-up letters of inquiry were mailed to the above-mentioned individuals and to Mr. Richard Pezzulo, Chief Operating Officer of the Office of Hawaiian Affairs, on January 3, 2012. At the request of Mike Hunnemann, of KAI Hawaii, the legal notice for the *The Garden Island*, only, was revised and re-posted on January 18, 19, and 22, 2012 (see Appendix C).

In an electronic transmittal (to Cathleen Dagher dated November 7, 2011) Pat Griffin stated that “[b]oth Puuopae and Opaekaa are on the National Register of Historic Places.....” and that “...Cultural Surveys did an assessment for Puuopae –some time before 2004...” Ms. Griffin also stated that “...[t]hese bridges, along with the one-lane bridge on Kalama Road (local folks here know it as Yasutake’s Bridge--as with Opaekaa, it has parts from the old Wailua River Bridge...[and] are part of a network of passages that tell a strong story about the history of homesteading on Kauai in the early territorial period.” Ms. Griffin also recommended that Dr. Abba G. Lichtenstein, who submitted plans for the bridges to the Kaua`i County Department of Public Works during the proposal period around 1993, Andy Bushnell and Kiersten Faulkner as individuals knowledgeable about the area.

Andrew Bushnell responded via e-mail (dated November 23, 2011) and stated

“The person who you really need to speak with is Pat Griffin.... Several years ago she did considerable research on both the Pu`u`opae and `Opaeka`a bridges... At the time that the issue of the bridges came up several years ago, I approached several of the old-timers about the

bridge. The only one who had anything to share with me was Sam Hepa Sr. who has since died. He recalled walking from Olohena Road along Pu`u`opae Road on his way to Olohena School. He said that every once in a while he would cross the Pu`u`opae bridge by climbing the superstructure that used to be part of the bridge but has since been removed. He confirmed that the present bridge is the same bridge that was there in the 1930s when he was growing up.”

Kiersten Faulkner, Executive Director of the Hawaii Historic Foundation, provided the following comments via e-mail (dated December 9, 2011):

I assume that you have the National Register nomination forms for both Puuopae and `Ōpaeka`a bridges. These are the resource documents that describe the history and significance of the bridges themselves. They also include the research bibliography with additional source materials if you do original research. In addition, the County has drawings and plans related to the bridges. The Wailua Homesteads has a 100-year old history that you can research at the Kaua`i Historical Society. The Garden Island newspaper archives may also be helpful.

In a letter postmarked January 3, 2012, Ms. Dagher received a copy of letter from Barnes Riznik, previous Director Emeritus Grove Farm Museum and professional historian, to Larry Dill, Kaua`i County Engineer, previously of the Historic American Engineering Board, stating that he and Donald Jackson, had physically examined and described `Ōpaeka`a Bridge in an historical context and published the results (Jackson and Riznik 1978). Mr. Riznik stated in his January 2012 letter that “... [f]or the first time, in 1978 the Opaeka`a Bridge was recognized as historically significant in Hawaii; moreover, the bridge was identified nationally as the only British-made iron bridge in America.” Mr. Riznik goes on to say that in the 1990s he “...participated in meetings of the County Public Works Department staff, and its engineering consultants from Honolulu and the Mainland, who considered the Opaekaa Bridge worthy of repair...” Mr. Riznik closed the letter stating that he “...can only hope that the present comprehensive review of the bridge will produce a preservation rehabilitation plan for stabilization --- and continued practical use --- of this surviving historical structure on Kaua`i.”

Ron Terry recommended Allan Smith as an individual from the community knowledge about the project area (electronic transmittal from Mr. Terry to Cathleen Dagher dated November 23, 2011).

On February 8, 2011 SCS received an electronic transmittal (via e-mail) from Margery Freeman, a member of the community, stating that:

The Three bridges that are covered by this assessment are near my home on Kauai. There are a number of reasons these bridges should be kept as one lane bridges.

- 1) They are historic
- 2) They [sic] slow down traffic
- 3) They are safer than [sic] having people rush around on wide streets. The studies of their accidents are misleading. Most of those problems happened a mile or two away from the bridge so are not relevant to the bridge.
- 4) There is very little traffic on any of them
- 5) They contribute to keeping our rural life style which is very important to us.
- 6) Especially the Opaekaa [B]ridge is attractive and interesting because of its look and its historic past.

On February 17, 2012 SCS received an electronic transmittal (via e-mail) from Larry LaSota, a member of the community who resides between the `Ōpaeka`a and Pu`u `Ōpae Bridges in Wailua Homesteads. Mr. LaSota expressed concerns similar to Ms. Freeman's in that the one-lane bridge systems should not be replaced as they help to slow down traffic. Mr. LaSota further stated that "... [t]hese bridges are perfect the way they are (one lane) and should be kept that way" as replacing the bridges will alter the character of the neighborhood.

On February 21, 2012 SCS received an electronic transmittal (via e-mail) from Rayne Regush, community member. Ms. Regush believes the Pu`u `Ōpae, Ōpaeka`a, and Kapahi Bridges "...maintain the rural agricultural tradition of these communities; provide a touchstone contrasting territorial history and modern times; prompt us to embrace a slower pace of life; provide a rural/country feeling and charming experience; engender friendliness by yielding to oncoming traffic; serve as cultural landmarks of our rural communities; provide a source of community pride; and connect us to earlier times and offers opportunities for education..." .

Ms. Regush goes on to say that "... [t]he traditional activities that may be impacted are the same activities or intrinsic qualities that are identified in the State DOT's Scenic Byways Program.

- They have scenic qualities which provide a heightened experience. The landscape and bridge-scapes are striking and memorable.

- The natural qualities of the environment (the stream, fish, plants and wildlife) remain relatively undisturbed by manmade interventions.
- They have historic qualities. The bridges are legacies of the past which are historically significant. The bridges instill an appreciation for the past. They reflect the territorial days of agricultural settlements in these communities and continue to exemplify the tradition of a rural lifestyle today.
- These century old bridges have archeological qualities. And, a strong likelihood of the streams used traditionally for bathing.
- Recreational qualities such as the passive enjoyment of the landscape. As a pedestrian there is the opportunity for nature-watching, quietude and contemplation. Driving on the bridge is a pleasurable recreational experience as well.”

Ms. Regush suggested contacting Erik Burton as an individual knowledgeable about traditional lifeways and cultural practices conducted in the area of the three bridges. On February 28, 2012, SCS initiated consultation with Mr. Burton, via e-mail.

On March 3, 2012 SCS received an electronic transmittal (via e-mail) from Mr. Erik Burton, Operations Director at the Ethnobotany Research and Applications Journal, stating:

As to the Pu`u `Opae and `Opaeka`a bridge areas, I have found no specific written accounts of that area, other than general reports of a lushly farmed upland. The ali`i did have several sacred bathing ponds, and there are a number of sacred sites (and some scary ones) in the Wailua area – many not with state site numbers. After the industrial agricultural period, much of the area was scraped clean. The gullies and river flatlands are mostly preserved.

The agricultural complexes for Wailua Ahupua`a continue all the way to the base of Wai`ale`ale, where the village of Ka`uhau protects the lua trail up to the Alakai. Considering that Wailua was so developed, and looking at the lay of the land in these areas, my predictive model indicates that there were lo`i all along the `Opaeka`a Stream. With Wailua’s peak population pushing all the way to the base of Wai`ale`ale, they surly (sic) cultivated these easy to access and irrigate, gently sloping uplands. We are only at about 370’ elevation, so the growing climate here is good for many things.

SUMMARY

The “level of effort undertaken” to identify potential effect by a project to cultural resources, places or beliefs (OEQC 1997) has not been officially defined and is left up to the

investigator. A good faith effort can mean contacting agencies by letter, interviewing people who may be affected by the project or who know its history, research identifying sensitive areas and previous land use, holding meetings in which the public is invited to testify, notifying the community through the media, and other appropriate strategies based on the type of project being proposed and its impact potential. Sending inquiring letters to organizations concerning development of a piece of property that has already been totally impacted by previous activity and is located in an already developed industrial area may be a “good faith effort”. However, when many factors need to be considered, such as in coastal or mountain development, a good faith effort might mean an entirely different level of research activity.

In the case of the current undertaking, letters of inquiry were sent to individuals and organizations that may have knowledge or information pertaining to the collection of cultural resources and/or practices currently, or previously conducted in close proximity to Kapahi Bridge. As stated elsewhere in this document, consultation was sought from Pat Griffin, historian; Andy Bushnell, historian; Ron Terry; Tonia Moy, Fung Associates, Inc.; Allan Smith, community member; Kiersten Faulkner, Executive Director of the Hawaii Historic Foundation; Jan Tennbrugnengate, reporter; Cheryl Lovell-Obatake, community member; Spencer Leinweber, of Clever Construction; Clyde Nāmu`o, Director of the Office of Hawaiian Affairs (OHA); and Dr. Abba G. Lichtenstein, Advisory Board Member of the Historic Bridge Foundation; Ms. Rayne Regush, Kapaa Community Neighborhood Board; and to Mr. Richard Pezzulo, Chief Operating Officer of the Office of Hawaiian Affairs. In addition, a Cultural Impact Assessment Notice was published on December 14, 15, and 18, 2011, in *The Honolulu Star-Advertiser*, *The Garden Island*, which published on the same dates on Kaua`i, and the December issue of the OHA newspaper, *Ka Wai Ola* (see Appendix C). At the request of the client, Mike Hunnemann of KAI Hawaii, the legal notice for the *The Garden Island*, only, was revised and re-posted on January 18, 19, and 22, 2012 (see Appendix C).

Historical and cultural source materials were extensively used and can be found listed in the References Cited portion of the report. Such scholars as Samuel Kamakau, Martha Beckwith, Jon J. Chinen, Lilikalā Kame`eleihiwa, R. S. Kuykendall, Marion Kelly, E. S. C. Handy and E.G. Handy, and Mary Kawena Puku`i and Samuel H. Elbert and continue to contribute to our knowledge and understanding of Hawai`i, past and present. The works of these and other authors were consulted and incorporated in the report where appropriate. Land use document research was supplied by the Waihona `Aina 2011 Data base.

CULTURAL ASSESSMENT AND RECOMMENDATIONS

Based on no additional suggestions or information from the contacted individuals and organizations, newspapers, and negative results of the archival research, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights, or any ethnic group, related to gathering, access or other customary activities will not be affected by development activities. Because there were no cultural activities identified within the approximately 1 acre project area, there are no adverse effects.

REFERENCES

- Armstrong, R. Warwick
1983 *Atlas of Hawaii*. University of Hawaii Press, Honolulu.
- Beaglehole, J.C.
1967 *The Voyage of the Resolution and Discovery 1776–1780*. Hakluyt Society University Press, Cambridge.
- Beckwith, Martha
1976 *Hawaiian Mythology*. University Press of Hawai'i, Honolulu.
- Bennett, W.C.
1931 *Archaeology of Kaua'i*. B.P. Bishop Museum Bulletin No. 80. Honolulu.
- Bushnell, T., and H. Hammatt
1996 *Archaeological Investigation of Pu'uopae (Kalama) Bridge in Wailua Homesteads, South Olohena Ahupua'a, Puna District, Kauai, Hawaii*. Cultural Surveys Hawaii, Inc., Kailua.
- Bushnell, K.W., M. Mann, D. Borthwick, T. Bush, T. Tulchin, D. Shideler, and H.H. Hammatt
2002 *Archaeological Inventory Survey For the Proposed Kapa'a/Keālia Bike and Pedestrian Path, Kapa'a and Keālia, Kawaihau District, Kaua'i Island, Hawai'i*. Prepared for SSFM International Inc. Cultural Surveys Hawaii, Inc., Kailua.
- Calis, I.
2000 *End of Field Work Report: Human Burial Removal and Archaeological Monitoring, Kapa'a Beach Park Public Bathroom Installation, Kapa'a, Kaua'i*. Scientific Consultant Services, Inc., Honolulu.
- Chinen, Jon
1958 *The Great Mahele*. University of Hawai'i Press, Honolulu.

1961 *Original Land Titles in Hawaii*. Library of Congress Catalogue Card No. 61-17314.
- Condè, Jesse and Gerald Best
1973 *Sugar Trains, Narrow Gauge Rails of Hawaii*. Glenwood Publishers. Felton, California.
- Cook, Chris
1999 *Kaua'i, the Garden Island: A Pictorial History of the Commerce and Work of the People*. Donning Co., Virginia Beach.

- Dagher, C.A. and M.F. Dega
 2012 *Archaeological Inventory Survey for the Kapahi Bridge Replacement Project, Bridge Number 007460021146001, State Site 50-30-08-2157, Kapaa Homesteads I Series, Kapa`a Ahupua`a, Kawaihau District, Kaua`i Island, Hawai`i [TMK: (4) 4-6-004]*. Scientific Consultant Services, Inc., Honolulu.
- Daws, Gavin
 1968 *Shoal of Time*. University of Hawaii Press, Honolulu.
- Dega, Michael and James Powell
 2003 *Archaeological Monitoring During Phase I of the Kauai Rural Fiber Optic Duct Lines Project, Kaua`i Island, Hawai`i*. Scientific Consultant Services, Inc., Honolulu.
- Dole, Charles S.
 1916 "The Hui Kawaihau" pp.8–15. *A Paper read at the November meeting of The Kauai Historical Society* on Nov. 16, 1916 in Līhu`e, Kaua`i.
- Dorrance, William and Francis S. Morgan
 2000 *Sugar Islands*. Mutual Publishing. Honolulu.
- Earle, Timothy
 1978 "Economic and Social Organization of a Complex Chiefdom: The Halelea District, Kaua`i, Hawaii." *Anthropological Papers No. 63*. University of Michigan, Ann Arbor, Michigan.
- Folk, W.H., and H.H. Hammatt
 1991 *Addendum to Archaeological Survey and Subsurface Testing at Waipouli, Kaua`i, State of Hawaii, Site No. 50-30-08-1836*. Cultural Surveys Hawaii, Inc., Kailua.
- Folk, W.H., R. Chiogioji, M.J. McDermott, and H.H. Hammatt
 1991 *Archaeological Survey and Subsurface Testing at Waipouli, Kaua`i, State of Hawaii, Site No. 50-30-08-1836*. Cultural Surveys Hawaii, Inc., Kailua.
- Foote, D.E., E. Hill, S. Nakamura, and F. Stephens
 1972 *Soil Survey of the Islands of O`ahu, Maui, Molokai, and Lanai, State of Hawaii*. U.S. Department of Agriculture Soil Conservation Service, Washington. D.C.
- Giambelluca, T.W., M.A. Nuller, and T.A. Schroeder
 1986 *Rainfall Atlas of Hawai`i. Report R76*. Water Resources Research Center, University of Hawai`i, Manoa, for the Department of Land and Natural Resources, State of Hawai`i, Honolulu.
- Hammatt, H.H.
 1991 *Archaeological Testing Results for a 12-Acre Property, Coconut Plantation, Waipouli, Kaua`i*. Cultural Surveys Hawaii, Inc., Kailua.

- Handy, E.S.C., and E.G. Handy
 1972 *Native Planters in Old Hawaii*. B.P. Bishop Museum Bulletin No. 233.
 Honolulu.
- Joesting, Edward
 1987 *Kauai, The Separate Kingdom*. University of Hawaii Press and Kauai Museum Association, Limited. Honolulu.
- Jourdane, Elaine and Sara Collins
 1996 *Field Inspection of Inadvertent Burial Reported at Keālia, Kauai (KPD Case # 96-09757 Lt. Martin Curran KPD 241-6763) Keālia, Kawaihau, Kauai TMK: 4-7-03:2*
- Kamakau, Samuel
 1964 *Ka Po'e Kahiko*. Bishop Museum Publication 51. B.P. Bishop Museum, Honolulu.
 1991 *Nā Mo`olelo a Ka Po`e Kahiko*. Bishop Museum Press, Honolulu.
- Kame`eleihiwa, Lilikā
 1992 *Native Land and Foreign Desires: Pehea La E Pono Ai?* Bishop Museum Press, Honolulu.
- Kauai Historical Society
 1991 *The Kauai Papers. A Kauai Historical Society Publication*. Lihue.
- Kelly, Marion
 1983 *Nā Māla o Kona: Gardens of Kona*. Department of Anthropology Report Series 83-2. Bishop Museum, Honolulu.
 1998 *A Gunboat Diplomacy, Sandalwood Lust and National Debt*. In *Ka Wai Ola o OHA*, Vol. 15, No. 4, April 1998.
- Kirch, Patrick
 1985 *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory*. University of Hawaii Press, Honolulu.
- Kirch, Patrick V. and Marshall Sahlins
 1992 *Anahulu*. Vol. 1 and 2. University of Chicago Press, Chicago.
- Kuykendall, R.S.
 1938 *The Hawaiian Kingdom*. Vol. 1. University of Hawai'i Press, Honolulu.
- Lucas, Paul F. Nahoa
 1995 *A Dictionary of Hawaiian Legal Land-terms*. Native Hawaiian Legal

Corporation. University of Hawai'i Committee for the Preservation and Study of Hawaiian Language, Art and Culture. University of Hawai'i Press, Honolulu.

Lyons, C.J.

1875 *A Land Matters in Hawaii*. The Islander, Vol. I. Honolulu.

1903 "A History of the Hawaiian Government Survey with notes on Land Matters in Hawaii." *Hawaii Gazette*. Honolulu.

Macdonald, G.A., and A.T. Abbott

1970 *Volcanoes in the Sea*. University Press of Hawaii, Honolulu.

Moffat, Riley M. and Gary L. Fitzpatrick

1995 *Surveying the Māhele*. An Editions Book. Hong Kong.

Schmitt, Robert C.

1973 *The Missionary Censuses of Hawaii*. Bishop Museum, Honolulu.

Spencer Mason Architects

1989 *Historic Bridge Inventory: Island of Kauai*. Prepared for the State of Hawaii Department of Transportation, Highways Division, in cooperation with the U.S. Department of Transportation, Federal Highway Administration, Honolulu, HI.

State of Hawai'i Administrative Rules.

2002 *Rules Governing Procedures for Historic Preservation Review for Governmental Projects Covered Under Sections 6E-7 and 6E-8, HRS: Evaluation of Significance*. §13-275-6.

Takaki, Ronald

1983 *Pau Hana. Plantation Life and Labor in Hawaii*. University of Hawaii Press, Honolulu.

Waihona `Aina Database

2011 Mahele Database, www.waihona.com. Kaneohe, HI. Accessed January 2012.

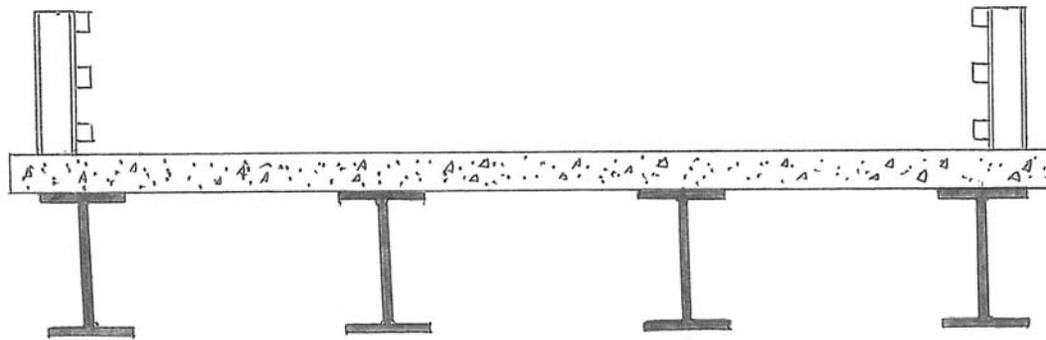
Wichman, Frederick B.

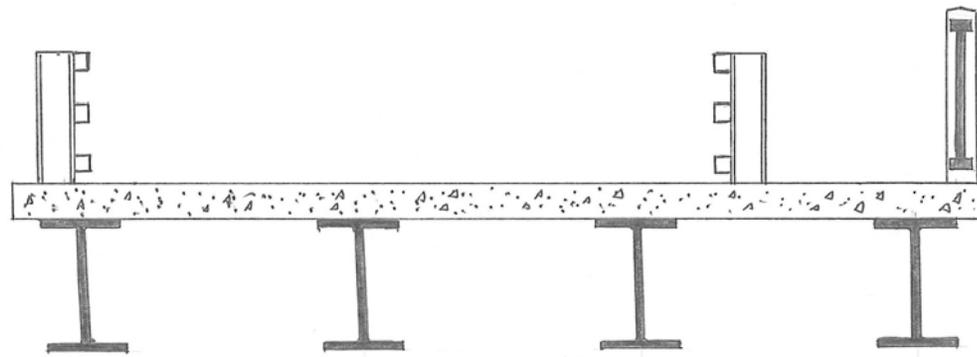
1998 *Kaua'i Ancient Place Names and Their Stories*. University of Hawaii Press: Honolulu.

Wilcox, Carol

1996 *Sugar Water: Hawaii's Plantation Ditches*. University of Hawai'i Press: Honolulu.

**APPENDIX A: PLAN VIEW DRAWINGS OF PROPOSED KAPAHI BRIDGE
REPLACEMENT OPTIONS**





APPENDIX B: EXAMPLES OF INITIAL LETTER ENQUIRIES

In compliance with the statutory requirements of the Federal National Environmental Policy Act (NEPA), the State of Hawai‘i Revised Statute (HRS) Chapter 343 Environmental Impact Statements Law, and in accordance with the State of Hawai‘i Department of Health’s Office of Environmental Quality Control (OEQC) Guidelines for Assessing Cultural Impacts as adopted by the Environmental Council, State of Hawai‘i on November 19, 1997. Scientific Consultant Services, Inc. (SCS) is in the process of preparing Cultural Impact Assessments (CIA) pertaining to approximately 1 acre of land on or around each of the three historic bridges on the island of Kaua‘i. According to documents supplied by KAI Hawaii, Inc., the existing Pu‘u ‘Ōpae Bridge, ‘Ōpaeka‘a Bridge, and Kapahi Bridge are going to be replaced and the surrounding lands may be impacted during construction activities. Archaeological reports of studies conducted in the areas of these bridges can be found on file at the State Historic Preservation Division (SHPD) Office.

The Pu‘u ‘Ōpae Bridge Complex (State Site 50-30-08-9397) is located in Wailua, South Olohena Ahupua‘a, Kawaihau District, Kaua‘i Island, Hawai‘i [TMK: (4) 4-4-002] (Figures 1 and 2). Pu‘u ‘Ōpae Bridge, often called Kalama Bridge and originally known as Kapaa Homesteads Bridge No. 2, was originally constructed in 1915. The bridge carries Pu‘u ‘Ōpae Road over Kalama Stream in the Kapaa Homesteads. Pu‘u ‘Ōpae Bridge was listed on the State Register of Historic Places in 2004 and on the National Register of Historic Places in 2005 as Site 05000536.

The ‘Ōpaeka‘a Stream Bridge Complex (State Site 50-30-08-9377) is located in Wailua, South Olohena Ahupua‘a, Kawaihau District, Kaua‘i Island, Hawai‘i [TMK: (4) 4-2-002] (Figures 3 and 4). ‘Ōpaeka‘a Bridge, often referred to as ‘Ōpaeka‘a Stream Bridge #1, was originally constructed in 1919 and carries ‘Ōpaeka‘a Road over ‘Ōpaeka‘a Stream. The bridge was listed on the National Register of Historic Places in 1983 as Site 83000253.

The Kapahi Stream Bridge Complex is located in Kapaa Homestead, Kapa‘a Ahupua‘a, Kawaihau District, Kaua‘i Island, Hawai‘i [TMK: (4) 4-6-004] (Figures 5 and 6). The Kapahi Bridge, which carries Kawaihau Road over Moalepe Stream, was constructed in 1937.

According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs... The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man made and natural which support such cultural beliefs...

We are asking you for any information that you or other individuals might contribute to the knowledge of traditional cultural activities, or traditional rights that might be impacted by the

replacement of the bridges. The assessment results are dependent on the response and contributions made by individuals and organizations such as yours.

Enclosed are maps showing the proposed project areas. Please contact me at our SCS Honolulu office at (808) 597-1182 with any information or recommendations concerning this Cultural Impact Assessment.

Sincerely yours,

Cathleen Dagher,
Senior Archaeologist
Enclosures (6)

Cc: Cheryl Lovell-Obatake; Clyde Nāmu`o; Jan Tennbrugnengate; Spencer Leinweber; Kiersten Faulkner, Kaliko Santos

[Re: Puu Opae Bridge, Opaekaa Bridge, and Kapahi Bridge](#)

FROM:

TO:

[Message flagged](#)

Tuesday, February 28, 2012 5:27 PM

Aloha Erik,

Your name and e-mail address were provided by Rayne Regush. I am preparing the Cultural Impact Assessments for the Puu Opae Bridge, Opaekaa Bridge, and Kapahi Bridge replacement projects and am in the midst of the consultatopm process. So, I am writing to ask if you have any information pertaining to cultural practices that were conducted in the vicinity of any of the bridges. I am also wondering if you could refer me to other knowledgeable individuals, or groups, who may also have knowledge to share?

Thank you for your help!

Cathleen

Cathleen Dagher

Senior Archaeologist

Scientific Consultant Services, Inc.

711 Kapi`olani Blvd., Suite 975

Honolulu, Hi. 96813

808 597-1182 (office)

808 597-1193 (fax)

APPENDIX C: LEGAL NOTICES

CULTURAL IMPACT ASSESSMENT NOTICE POSTED IN THE OFFICE OF HAWAIIAN AFFAIRS NEWSLETTER AND THE STAR ADVERTISER NEWSPAPER

Information requested by SCS

Of cultural resources or on-going cultural activities on or near this parcel near the `Ōpaeka`a Stream Bridge complex in Wailua, South Olohena Ahupua`a, Kawaihau District, Kaua`i Island, Hawai`i [TMK: 4-2-002].

Please respond within 30 days to SCS
at (808) 597-1182

CULTURAL IMPACT ASSESSMENT NOTICE POSTED IN THE GARDEN ISLE NEWS:

Information requested by Scientific Consultant Services, Inc. (SCS) for cultural resources or on-going cultural activities on or near the Pu`u `Ōpae Bridge, `Ōpaeka`a Bridge, and Kapahi Bridge in Kawaihau District, Kaua`i Island, Hawai`i. Please respond within 30 days to Scientific Consultant Services, Inc. at (808) 597-1182.

TO: Sugira
 FAX#/EMAIL: 597-1193
 CONTACT #: 597-1182
 DATE: 12/18/11
 ACCOUNT #: 57457
 FROM: Star-Advertiser/MidWeek-Legal Advertising Dept.

FAX: 808-529-4829

- Lisa Kaukani (808-529-4344)**
Email: lkaukani@staradvertiser.com
- Rose Rosales (808-529-4825)**
Email: rrosales@staradvertiser.com

Remit Payment to:
 Honolulu Star-Advertiser/Midweek
 500 Ala Moana Blvd., 7 Waterfront Plaza, Ste. 500
 Honolulu, HI 96813

PUBLICATION: 12/14, 12/15, 12/18/11
 CLASSIFICATION: Public Notices
 Paper: Star Advertiser Staradvertiser.com
 MidWeek Monster.com
 SIZE: 2 column(s) x 1.0 "
 Affidavit
 TOTAL COST \$ 507.96
 Proof Enlarged to 125%/150%/175%

SEE ATTACHED FOR PROOF

AD # 373415

AD PROOF

*****APPROVAL BY*****
12 am/pm Tues 12/13/11

Correction(s) noted on proof
 Proof OK as is Date 12-8-2011

Payment Method (Circle):
 Prepayment: _____ Invoice: _____
 P.O.# _____ Check# _____
 PCARD/CC _____
 EXP _____ CID Code _____
 CARD HOLDER _____

Ad will not be released for publication unless payment & signature is received by above date and time

*Signature: Suanna B...

Please proof read thoroughly.
 Oahu Publications, Inc. will not be responsible for any errors, typographical or otherwise, once the proof has been approved and signed by the customer.

CULTURAL IMPACT ASSESSMENT NOTICE:
 Information requested by SCS Of cultural resources or on-going cultural activities on or near this parcel near the Pu'u 'Opae Bridge Complex in Wailua, South Oloheua Ahupua'a, Kawaihau District, Kaua'i Island, Hawai'i (TMK: (4) 4-2-02), Please respond within 30 days to SCS at (808) 597-1182 (SA373415 12/14, 12/15, 12/18/11)

Received Time Dec. 8. 3:32PM

APPENDIX D: EXAMPLES OF FOLLOW-UP LETTERS OF INQUIRIES

This is our follow-up letter to our December 12, 2011 letter which was in compliance with the statutory requirements of the Federal National Environmental Policy Act (NEPA), the State of Hawai'i Revised Statute (HRS) Chapter 343 Environmental Impact Statements Law, and in accordance with the State of Hawai'i Department of Health's Office of Environmental Quality Control (OEQC) Guidelines for Assessing Cultural Impacts as adopted by the Environmental Council, State of Hawai'i, on November 19, 1997.

Scientific Consultant Services, Inc. (SCS) is in the process of preparing Cultural Impact Assessments (CIA) pertaining to approximately 1 acre of land on or around each of the three historic bridges on the island of Kaua'i. According to documents supplied by KAI Hawaii, Inc., the existing Pu'u 'Ōpae Bridge, 'Ōpaeka'a Bridge, and Kapahi Bridge are going to be replaced and the surrounding lands may be impacted during construction activities. Archaeological reports of studies conducted in the areas of these bridges can be found on file at the State Historic Preservation Division (SHPD) Office. Please refer to our December 12, 2011 letter for locational maps for the three project areas.

The Pu'u 'Ōpae Bridge Complex (State Site 50-30-08-9397) is located in Wailua, South Olohena Ahupua'a, Kawaihau District, Kaua'i Island, Hawai'i [TMK: (4) 4-4-002]. Pu'u 'Ōpae Bridge, often called Kalama Bridge and originally known as Kapaa Homesteads Bridge No. 2, was originally constructed in 1915. The bridge carries Pu'u 'Ōpae Road over Kalama Stream in the Kapaa Homesteads. Pu'u 'Ōpae Bridge was listed on the State Register of Historic Places in 2004 and on the National Register of Historic Places in 2005 as Site 05000536.

The 'Ōpaeka'a Stream Bridge Complex (State Site 50-30-08-9377) is located in Wailua, South Olohena Ahupua'a, Kawaihau District, Kaua'i Island, Hawai'i [TMK: (4) 4-2-002]. 'Ōpaeka'a Bridge, often referred to as 'Ōpaeka'a Stream Bridge #1, was originally constructed in 1919 and carries 'Ōpaeka'a Road over 'Ōpaeka'a Stream. The bridge was listed on the National Register of Historic Places in 1983 as Site 83000253.

The Kapahi Stream Bridge Complex (State Site 50-30-08-2157) is located in Kapaa Homestead, Kapa'a Ahupua'a, Kawaihau District, Kaua'i Island, Hawai'i [TMK: (4) 4-6-004]. The Kapahi Bridge, which carries Kawaihau Road over Moalepe Stream, was constructed in 1934.

We are asking you for any information that might contribute to the knowledge of traditional activities, or traditional rights that might be impacted by development of the property. The

assessment results are dependent on the response and contributions made by individuals and organizations such as yours.

Please contact me at our SCS Honolulu office at (808) 597-1182; with any information or recommendations concerning this Cultural Impact Assessment.

Sincerely,

Cathleen Dagher
Senior Archaeologist
Cc: Cheryl Lovell-Obatake; Richard Pezzulo; Jan Tennbrugnengate

APPENDIX E: INQUIRY RESPONSES

July 3, 2008

BY EMAIL

Wallace Kudo
Department of Public Works, Engineering Division
County of Kaua'i
4444 Rice Street, Suite 175
Lihue, Hawaii 96766-1340

Dear Mr. Kudo,

On behalf of the National Trust for Historic Preservation, I am writing to express our grave concerns regarding the proposed replacement of the historic Ōpaeka'a Bridge. We have been advised by local residents that the County may have entered into a contract for work that may lead to the demolition of the bridge.

The purpose of this letter is to urge the County not to make any alterations to this historic bridge without ensuring that all federal environmental and historic preservation requirements have been satisfied. If the County were to alter or demolish the bridge at this stage, it would be in jeopardy of losing its eligibility for all federal funding and permits necessary for the project.

The Ōpaeka'a Bridge may be small, but it is highly significant. The bridge was listed on the National Register of Historic Places in 1983. It is the only known British truss bridge in the United States. World renowned bridge engineer Abba Lichtenstein described it as "perhaps the most important bridge in the state of Hawai'i."¹ If this bridge is demolished, a significant icon of history, engineering, and architecture will be lost forever.

Legal Constraints on the Ōpaeka'a Bridge Replacement Project

The replacement of the Ōpaeka'a Bridge is identified under the current draft of the Statewide Transportation Improvement Program as a project intended for

¹ **Kauai Garden Island News, May 22, 2008, Saving 'Opaeka'a and Pu'u'opae bridges.**
<http://www.kauaiworld.com/articles/2008/05/23/lifestyles/lifestyles05.txt>

Mr. Wallace Kudo
July 3, 2008
Page 2 of 4

federal funding.² The anticipated allocation for planning and design for the "Opaekaa Bridge Replacement" is \$1,000,000 with 80% to be reimbursed to Kaua'i County by the Federal Highway Administration (FHWA).

If the County intends to rely on federal funding, federal laws require compliance with the National Environmental Policy Act (NEPA), 42 U.S.C. § 4332(2)(C), Section 106 of the National Historic Preservation Act (NHPA), 16 U.S.C. § 470f; 36 C.F.R. Part 800, and Section 4(f) of the Department of Transportation Act, 49 U.S.C. § 303(c); 23 C.F.R. Part 774. We have not been able to confirm that any of these environmental and historic preservation requirements have been met. Compliance with these laws is required prior to any allocation from FHWA for activities related to bridge replacement.

You should also be aware that any alteration or demolition of the bridge prior to approval from FHWA would constitute "anticipatory demolition" under Section 110(k) of the National Historic Preservation Act, 16 U.S.C. § 470(h)-2(k); 36 C.F.R. § 800.9(c). Violation of Section 110(k) would prohibit the FHWA and other federal agencies from authorizing any funding or permits for this project. This penalty is imposed because the preemptive destruction of an historic structure forecloses the opportunity for the Advisory Council on Historic Preservation to comment on the project in any meaningful way. 36 C.F.R. § 800.9(b). Section 110(k) provides this strict remedy to discourage such action. It states:

[E]ach federal agency shall ensure that the agency will not grant a loan, loan guarantee, permit, license, or other assistance to an applicant who, with intent to avoid the requirements of section 106, has intentionally significantly adversely affected a historic property to which the grant would relate, or having legal power to prevent it, allowed such significant adverse effect to occur

16 U.S.C. § 470h-2(k); see 36 C.F.R. § 800.9(c) (emphasis added).

In this case, if the City were to allow the alteration or demolition of the historic Opaekaa Bridge, FHWA and other federal agencies would be required to deny applications for any federal funds or any permits for this project. In addition, we

² **Hawaii Department of Transportation, June 2, 2008, Draft Statewide Transportation Improvement Program, Revision #4, FY 2008 thru FY 2013**, p. 27. <http://hawaii.gov/dot/highways/STIP/080602%2008-13%20STIP%20Draft%20Revision%20%234%20after%20OSRs.pdf/view>

Mr. Wallace Kudo
July 3, 2008
Page 3 of 4

believe Section 110(k) would prohibit any future federal funding for permits relating to the site.

Additionally, Section 4(f) is likely to prohibit replacement of the historic Bridge, unless the County can demonstrate that there is "no feasible and prudent alternative" to its demolition. 49 U.S.C. § 303(c); 23 C.F.R. Part 774. To our knowledge, no such showing has been made. If such documents exist, please provide us a copy.

Interests of the National Trust for Historic Preservation

The National Trust for Historic Preservation was chartered by Congress in 1949 to promote the historic preservation policy of the United States, and to facilitate public participation in historic preservation. 16 U.S.C. § 468. In addition to its headquarters in Washington, D.C., the National Trust has nine regional and field offices, including a Western Office in San Francisco which is specifically responsive to Hawaii preservation concerns. With the strong support of our 285,000 members nationwide, the National Trust works to protect significant historic sites, to strengthen and revitalize communities, and to advocate historic preservation as a fundamental value in programs and policies at all levels of government. The President of the National Trust has also been designated by Congress as a member of the Advisory Council on Historic Preservation, the independent federal agency responsible for assisting other agencies to implement Section 106 of the National Historic Preservation Act. *Id.* § 470i(a)(8).

Thank you for considering the views of the National Trust on this important issue. We trust that you will take the mandates of Section 106 of the National Historic Preservation Act and Section 4(f) of the Department of Transportation Act seriously, and we appreciate the opportunity to outline our understanding of the relevant legal constraints that apply to this project. We would be happy to discuss this matter with you in more detail.

Sincerely,



Brian R. Turner, Esq.
Law Fellow, Western Office

Mr. Wallace Kudo
July 3, 2008
Page 4 of 4

cc:

Pat V. Phung, FHWA
Mary Ann Naber, Federal Preservation Officer, FHWA
Carol Legard, ACHP
Steven Kyono, HI DOT
Mayor's Office, County of Kaua'i
Dennis Alkire, Kaua'i Planning Department
Astrid Liverman, SHPD
Puaalaokalani Aiu, SHPD
Mary Requilman, Kaua'i Historical Society
Kiersten Faulkner, Historic Hawaii Foundation
Pat L. Griffin
Lani Ma'a Lapilio, NTHP Advisor
Millicent M.Y.H. Kim, NTHP Advisor
Kitty Henderson, Historic Bridge Foundation
Elizabeth Merritt, Deputy General Counsel, NTHP
Dr. Abba G. Lichtenstein

Aloha Cathleen,

Please accept my comments for the Cultural Impact Assessment (CIA) pertaining to the three historic one-lane bridges in the Kawaihau District of Kauai -- Puuopae Bridge, Opaekaa Bridge and Kapahi Bridge. These bridges:

- maintain the rural agricultural tradition of these communities
- provide a touchstone contrasting territorial history and modern times
- prompt us to embrace a slower pace of life
- provide a rural/country feeling and charming experience
- engender friendliness by yielding to oncoming traffic
- serve as cultural landmarks of our rural communities
- provide a source of community pride
- connect us to earlier times and offers opportunities for education

Pre-historian Erik Burton offered a brief comment to me by email. He wrote: In my opinion, the Wailua uplands were extensively farmed in old times, including all along Opaekaa stream. Sacred swimming pools for alii etc. You may wish to contact him at eburton@restorekauai.org

The traditional activities that may be impacted are the same activities or **intrinsic qualities** that are identified in the **State DOT's Scenic Byways Program**.

- They have **scenic qualities** which provide a heightened experience. The landscape and bridge-scapes are striking and memorable.
- The **natural qualities** of the environment (the stream, fish, plants and wildlife) remain relatively undisturbed by manmade interventions.
- They have **historic qualities**. The bridges are legacies of the past which are historically significant. The bridges instill an appreciation for the past. They reflect the territorial days of agricultural settlements in these communities and continue to exemplify the tradition of a rural lifestyle today.
- These century old bridges have **archeological qualities**. And, a strong likelihood of the streams used traditionally for bathing.
- **Recreational qualities** such as the passive enjoyment of the landscape. As a pedestrian there is the opportunity for nature-watching, quietude and contemplation. Driving on the bridge is a pleasurable recreational experience as well.

These **intrinsic qualities** that characterize the State DOT's Scenic Byways Program and which these 1-lane bridges exemplify, are in jeopardy of being lost if the

County replaces them without following historic preservation standards, or if they are replaced with 2-lane structures.

Mahalo,
Rayne



Ancient Kaua`i Mapping Project: Using GIS to locate and map ancient Hawaiian agricultural landscapes on Kaua`i

Erik Burton

Research

Abstract

GIS tools are used to develop a predictive model for identifying the primary agricultural complexes on Kaua`i, and to conduct a systematic aerial survey for transported landscapes. Comparisons are made to historical records, and place names are matched to elements of the ancient agricultural landscape. Results are recorded in a series of layers enabling spatial analysis and 3D visualization of the data in its environment. The resulting GIS layers and master model allows custom data views to be created by enabling selected layers, so that desired aspects of the agricultural landscape can be visualized. The resulting layers are discussed as individuals and also how they interact to provide a view of the ancient integrated agricultural landscape. Conclusions about the predictive model for agricultural complexes, the ethnobotanical surveys and the historical records are discussed.

Mo`olelo ho`opokole

Ua hana GIS no ke kukulu kumu alaka`i e wanana i na wahi mala `ai ma Kaua`i, a e alaka`i i ke kilo mokulele no na `aina loli `ia. Ua ho`okuku `ia me na palapala mo`aukala, a ua ho`olikelike `ia na inoa wahi me na mea `awe`awe`a o na mala kahiko. Ua kukulu i na lalani papa GIS i mea e wehewehe, a he ho`ike 3D i ua `ikepili nei. Hiki ke koho i na papa makemake `ia e ho`ike ai. He `olelo kuka ko ia nei no na papa kekahi i kekahi, a me ko lakou hana pu `ana ma ka `aina kahiko. Ua ho`oholo i hopena no ke kumu alaka`i wanana no na mala kahiko, na kilo kalailau, me na palapala mo`aukala.

Introduction

Study Location

Kaua`i is the westernmost (Figure 1) of the main Hawaiian Islands, nearly circular in form and approximately 25 miles by 35 miles. Its central massif, Wai`ale`ale, captures legendary amounts of rainfall as its peak of just over 5,000 feet punctures the trade wind (Ramage & Schroeder 1999) powered cloud layer passing overhead, forming the dominant weather pattern on Kaua`i. Like the other Hawaiian Islands, Kaua`i is generally wet on the north and east sides, dryer on the west and south sides.

Background

Ancient Hawaiian Agriculture

Ancient Hawaiians were master agriculturists (Handy *et al.* 1991) who developed and recognized hundreds of varieties

Correspondence

Erik Burton, Kapa`a, Kaua`i, Hawai`i, U.S.A.
kuaibanaganagy@gmail.com

Ethnobotany Research & Applications 9:349-377 (2011)

Published: December 11, 2011

www.ethnobotanyjournal.org/vol9/i1547-3465-09-349.pdf



Figure 1. Hawaiian Islands with Kaua'i as the westernmost of the major islands. Image generated with Google Earth.

ies of taro (*Coccoloba esculenta* (L.) Schott), **ʻuala** (sweet potatoes, *Ipomoea batatas* (L.) Lam.), and **mai'a** (banana hybrids, *Musa acuminata* x *balbisiana* Colla). Their agricultural practices were highly adapted for each particular microclimate, with appropriate cultivars used for a particular area or production requirement. Hawaiians were also distinguished for having extensive **loʻi** (pond field irrigation systems) that could produce immense quantities of taro (Handy et al. 1991).

Kaua'i is ideal for taro production with its long, well watered valleys (Ladefoged et al. 2009). Pond field irrigation systems are best suited for islands with lots of bottom land that can be reached by irrigation ditches. Kaua'i, as the oldest of the main Hawaiian Islands, is ideally suited for this type of agricultural development, as it possesses many long valleys with gentle slopes (Kirch & Rallu 2007, Ladefoged et al. 2009).

A review of the old maps stored in the Kauai Historical Society (KHS 2009), and online with the David Rumsey map collection (Rumsey 2009), produced few maps of inland agricultural complexes. The earliest and most detailed maps were created by the sugar plantations and focused on their coastal land holdings, while the interiors are marked unexplored and don't reflect even a rudimentary understanding of the topography.

After contact with European peoples, the Hawaiian population began declining precipitously and ultimately fell by perhaps as much as over 80% (Kamakau 1992, Kirch & Rallu 2007). The resulting cultural collapse, along with newly introduced foreign goods and customs, ultimately created something of a disconnect with the ways and knowledge of the people of old. By the time detailed maps were first being made (1840s), knowledge of the abandoned upland agricultural systems had mostly been lost to history.

The interior of Kaua'i is mostly preserved from the impacts of development and industrial agriculture, with over 60% of the island classified as conservation land (The State of Hawai'i Data Book 2004). By looking at Kaua'i in Google Earth it is evident that, due to the remoteness of much of its interior terrain, most of this conservation land was not utilized by modern agriculture or ranching, preserving it much as it was when abandoned by the ancient Hawaiians. Remnants of transported landscapes are still to be seen in these well preserved areas, along with earthen and rock walls that supported the agricultural infrastructure (Burton, personal hikes). A wide range of preservation levels exist, from sites completely overgrown in **hau** (*Hibiscus tiliaceus* L.) or bamboo (some of which is the ancient introduced **ʻohe**, *Schizostachyum glaucifolium*).

um (Rupr.) Munro), to places that look like they could have been abandoned just a few decades ago.

Pressures from a variety of sources including cattle ranching, industrial agriculture, feral pigs, goats and even illegal campers have led to the degradation of many readily accessible sites. Some plants left over from ancient Hawaiian agroforestry practices have become invasive and are growing unchecked (Figure 5), suffocating agricultural complexes, agroforestry remnants and native plant communities. Of these plants, hau and `ohe are the worst as they both form dense, difficult to penetrate thickets that allow for little else to grow under their canopies.

Historical records on the subject of inland agriculture are a bit vague. Handy et al. (1991) indicate that they would expect agricultural complexes to be found in a number of upland valley sites. In Ladefoged et al. (2009) a predictive model is presented that estimates which lands are best suited for pond field and dryland farming based on "climate, hydrology, topography, substrate age, and soil fertility". The efficiency of labor used for production of wetland taro compared to dryland agriculture is also explored.

Since terms about GIS and Hawaiian agricultural practices vary in their use, Table 1 is provided to indicate how they have been defined within this document.

Plants from Transported Landscapes

When the ancient Polynesians colonized Hawai'i, they brought their favorite plants (Abbott 1992) and began transforming previously untouched lands to meet their needs. Plants that still grow where they were planted long ago, and are visible in aerial imagery, include `ohe, mai'a, hau, kukui and Hawaiian ti. Although mango's were introduced in historic times, Hawaiians planted them on the lands that they were still using, and many remain today in lands that are now considered forest. Geo-referenced aerial photographs are studied in detail to map each of these residual transported landscapes:

`ohe

Schizostachyum glaucifolium is the Hawaiian `ohe (St. John 1978), and is a clumping variety (Figures 2, 3) that goes to seed once every 30 years. This species can occasionally form dense groves and appear to be a running variety (White 2003) as it has also reproduced by seed. It has extremely thin walls and long internodes, often used

Table 1. Definitions for technical terms used in this document.

Agricultural Complex
Hawaiians created a series of pondfield agricultural systems (similar to rice paddies) that were fed by a primary ditch pulling water from the stream and feeding a series of smaller ditches which in their turn supply the individual lo'i (agricultural pondfield). At the end of a system, the primary ditch typically returns the remaining water back to the river with each systems design adapting to local conditions.
Ancient Hawaiian Land Divisions and Tenure
Under the Ancient Hawaiians system of holding land, the king owned the island and allowed his subjects to use the land. Kauai was divided into five moku (districts) named Hale'lea, Ko'olau, Puna, Kona and Napali. These moku were further divided into ahupua'a (valley or watershed) which were individually managed by a konohiki (kings land agent) who allotted land to inhabitants (Kirch 1985) and ensured that the agricultural systems functioned productively.
Geographical Information Systems (GIS)
GIS programs allow users to navigate and view geographic information overlaid on a virtual globe of the world. Spatial analysis can be performed and custom maps can be created with a variety of data layers. Two GIS applications were used for this project: Google Earth (Google Earth) and Pictometry (Pictometry International Corporation).
Google Earth
Designed for use by a variety of skill levels, Google provides a GIS application that allows users with very little or no previous GIS experience to view and explore GIS layers while "flying" through a 3D landscape. The imagery resolution for Kauai is adequate to identify larger trees but not smaller plants such as bananas and ti. Custom data sets (layers) are easy to create and share.
Pictometry
Although the imagery available from Google Earth is useful, Pictometry has a much higher resolution package of 6-inch pixel geo-referenced aerial oblique imagery. Although it was developed primarily for Urban Planners, Pictometry provides up to 12 different views of a given area which makes it useful for conducting surveys of an ancient agricultural landscape. The extensive database of 15 Mb JPEG images are geo-referenced to the pixel, allowing users to measure and locate objects in the images with a variety of different tools including location, area, height, distance, elevation and bearing.



Figure 2. Clump of *Schizostachyum glaucifolium* (Rupr.) Munro in upper Wailua ahupua'a, Kaua'i, Hawaiian Islands. (The same clump is shown in Figure 2.) Photo by Erik Burton.



Figure 3. Clump of *Schizostachyum glaucifolium* (Rupr.) Munro in upper Wailua ahupua'a, Kaua'i, Hawaiian Islands. (The same clump is shown in Figure 2.) Photo courtesy of Pictometry International Corp.

According to Handy *et al.* (1991), this variety was too soft for use in construction but was made into rattles for hula performances (**pu'ili**) & nose flutes (**ohe-hano-ihu**). Perhaps its most important use was for a quick and sharp knife. According to McClatchey (2010), Polynesians still recognize that this is among its most important qualities.

Lundstrom (2010) says that *S. glaucifolium* was used for musical instruments, tattoo needles, surgical scalpels and water containers. It will not root and grow from nodal cuttings but occasionally produces some seed. It does not flower gregariously and die, as many other bamboos do.

Another bamboo that I am seeing in enough quantity to merit mentioning is a thin, spreading taxa that forms massive and dense clumps (Figures 4, 5).

Mai'a

Musa acuminata x balbisiana hybrids are visible in Pictometry imagery, and I have found a number of them on my hikes. At least 80 varieties were planted (Handy *et al.* 1991) in old times for food and other purposes. Today about 40 variety names survive with fewer than 30 of them actually located (Kepler 2008).

All of these varieties (except for two) are seedless (Handy 1940, Kepler 2008) and rely up human intervention for es-



Figure 4. Thin spreading bamboo in Makaleha, Kaua'i, Hawaiian Islands. Photo by Kristar Burton.



Figure 5. Thin spreading bamboo in Wailua, Kaua'i, Hawaiian Islands. Photo courtesy of Pictometry International Corp.

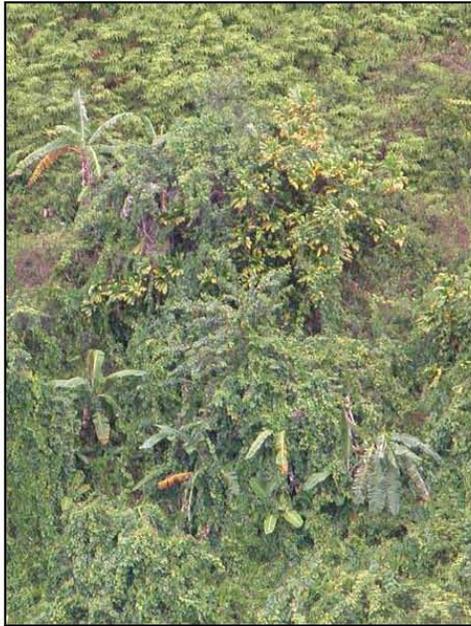


Figure 6a. Iholena bananas (*Musa acuminata* x *balbisiana* Colla) on the side of a hill in Wailua, Kaua'i, Hawaiian Islands. Photo by Erik Burton.

establishment of new plantings. Plants seen in the Kaua'i backcountry today (Figure 6a) are descendents of these ancient plantings.

Each of these varieties was selected because they had a unique feature or desirable trait. Some of these varieties were eaten raw while others were cooked before eating. In addition to roasting in an **imu** (underground oven) or on hot coals, a pudding-like dish called **piepiele** (Abbott 1992) was made from mashed ripe **iholena lele** bananas (Figure 6b) which were mixed with coconut cream, wrapped in **ti** leaves and steamed in the **imu**.

Traditional Hawaiian bananas are under assault today (Kepler 2008) as pigs are uprooting mature plants to eat the corms, banana bunchy top virus (Bunchy top 2006) has spread to most inhabited parts of Kaua'i and I have found corn borers infesting wild clumps – even in the remote interior. An effort to preserve and identify these unusual varieties has been started at the National Tropical Botanical Gardens (Limahuli). Identifying the varieties that are growing in the most remote parts of the island has proven to be a challenge, as some do not match any of the historical descriptions.



Figure 6b. Iholena lele bananas (*Musa acuminata* x *balbisiana* Colla) in Kaua'i, Hawaiian Islands. Photo by Erik Burton.

Hau

Another plant of many uses, **hau** (*H. tiliaceus*) was never left alone to grow out of control in ancient times. Instead, it was constantly harvested for its multitude of uses (Handy *et al.* 1991) including bark for rope, flowers for medicine, wood for starting fires and fishing net floats, skirts for hula, and booms for outrigger canoes.

Today the **hau** trees (Figure 7) are growing out of control and are consuming vast areas that were previously used for Hawaiian agriculture. Like running bamboo, **hau** spreads (Figure 8) and swallows up whatever other plants or agricultural structures are in the way. Left unchecked to grow at will, it will continue to transform the landscape of Kaua'i's remote areas.

As it stands today, reaching many of these remote areas is made difficult by the challenge presented in getting through dense stands of **hau** – often leaving me wondering "**hau**" the heck to get through or around it. As local Kaua'i lore has it, **hau** leaves even roughly resemble the island of Kaua'i including its major rivers and valleys (Wichman n.d.).



Figure 7. Hau (*Hibiscus tiliaceus* L.) bush and flowers in Kaua'i, Hawaiian Islands. Photo by Erik Burton.



Figure 8. Extensive hau (*Hibiscus tiliaceus* L.) coverage in Keahua valley, Wailua, Kaua'i, Hawaiian Islands. Photo by Erik Burton.



Figure 9a. Common mangos (*Mangifera indica* L.) on a trail in Wailua, Kaua'i, Hawaiian Islands. Photo by Erik Burton.

Mango

With the early western explorers came many food plants new to the Hawaiians including mango trees. The common mango (*Mangifera indica* L.) (Figure 9a) was planted by the Hawaiians near their agricultural sites (Figure 9b) and these trees can still be seen today.

According to Morton (1987), "The earliest record of the mango in Hawai'i is the introduction of several small plants from Manila in 1824. Three plants were brought from Chile in 1825. In 1899, grafted trees of a number of Indian varieties, including **pai**ri, were imported. Seedlings became widely distributed over the six major islands. In 1930, the Haden variety was introduced from Florida and became established in commercial plantations. The local industry began to develop seriously after the importation of a series of monoembryonic cultivars from Florida. But Hawaiian mangos are currently prohibited from entry into mainland U.S.A., Australia, Japan and some other countries, because of the prevalence of the mango seed weevil in the islands."

Many magnificent specimens of these mango trees remain today (Figure 9b) in both accessible and somewhat remote places. People are still harvesting and enjoying the fruit of these trees (Figure 9a), a gift from the past that just keeps on giving. Although mango trees were not introduced by Polynesian settlers, they were planted by Hawaiians during the early contact period. Further research is needed to determine the variety(s) or cultivar(s) of these plantings.

Hawaiian ti

Cordyline fruticosa (L.) A. Chev., (Figure 10) does not produce seed in Hawaii as it does not appear to produce viable pollen (Yen 1987). All plants have been propagated through vegetative cuttings such as a fly wisk discarded along the route of an ancient trail. Others were planted to consecrate special areas or around a home, planted in upland gardens (Kepler 1998) for util-



Figure 9b. Common mangos (*Mangifera indica* L.) in flower on a Kaua'i hillside, Hawaiian Islands. Photo by Erik Burton.

ity purposes, emergency food and in more recent times, **okolehao** (alcohol) production.

An indeterminately growing plant of 1,000 years and 1,000 uses (McClatchey 2010), **tī** was treasured by the Hawaiians for its many uses including medicinal, food containers for serving or steaming food in the **imu** (ground oven), leaves for weaving just about everything and even thatching houses. **Tī** was even used as a famine food or for a welcome treat (Abbott 1992), by slow baking the huge starchy roots until they turned into a sweet sugary mass.

During the U.S. era of alcohol prohibition, **tī** was planted for **okolehao** production. **Okolehao** (iron bottom) is a form of alcohol based on the sugar produced by baking the **tī** root (Abbott 1992). Different stories account for the name "iron bottom" including the idea that you need one

to be able to drink the strong drink that was produced. Another explanation is that some of the iron try-pots from the whaling ships were combined with an old gun barrel to create a still (Fornander 1916-1917).

Oddly enough, the aerial signature for **tī** plants is a yellow circle (Figure 11) as the dying leaves stand out from the surrounding green foliage.

Historical Records

The Great Mahele (historic land division) preserved a remarkable amount of place names for features associated with agricultural complexes, and related places claimed by Hawaiians during the years of 1848 to 1849. These records have recently been posted online (Ulukau 2011).



Figure 10. Hawaiian **tī** (*Cordyline fruticosa* (L.) A. Chev.) in Kaua'i, Hawaiian Islands. Photo by Erik Burton.



Figure 11. Hawaiian **tī** (*Cordyline fruticosa* (L.) A. Chev.) in Lumaha'i valley, Kaua'i, Hawaiian Islands. Photo courtesy of Pictometry International Corp.

Before 1848, all lands on an island were held by the Ali'i *ʻai Moku* (lit. chief who eats the island) and apportioned to commoners through a *konohiki* who directed an entire *ahupuaʻa*. Whenever a new Ali'i *ʻai Moku* would assume rule over an island, a *mahele* (division) was held and lands could be re-divided according to the new chief's wishes. The Great Mahele (Moffat & Fitzpatrick 1995) of 1848 transformed this ancient land tenure practice into our modern system of land ownership, effecting dramatic change to the Hawaiian lifestyle. After the Great Mahele, *konohiki* were no longer needed and so many found themselves destitute that a special act was passed to help them acquire some land.

In addition to the Great Mahele records, many old maps exist that have a number of agricultural features outlined and named. Most of these are maps of sugar cane and pineapple field systems in the early 1900's.

The Kauai Historical Society has extensive records on file including the unpublished work of Fred Wichman who collected so many place names for Kaua'i.

Summary

Hawaiians heavily modified their agricultural landscape to maximize production of food and other resources for a particular *ahupuaʻa*. Modern agriculture has greatly impacted these ancient systems in the more accessible areas; however, vast portions of the interior of Kaua'i appear to be largely untouched since they were abandoned by the ancient Hawaiians.

Easy to use GIS tools with decent imagery present us with an opportunity to record these ancient sites before they completely disappear. Using GIS tools to model their abandoned agricultural systems can provide a view into the extent of landscape modification for agricultural production during an ancient time of peak population.

Objectives

Building on the history presented above I set out in this project to achieve three objectives:

1. Develop a method of identifying the primary agricultural complexes within an *ahupuaʻa*.
2. Conduct a GIS based aerial survey of an *ahupuaʻa* detailing the location of plants from transported landscapes.
3. Develop a GIS model of information from the historical archives that can be used to compare with the results from Objectives 1 & 2.

Methods

Using GIS to visually analyze an ancient agricultural landscape requires the creation of data sets that are repre-

sented as GIS layers. For the three GIS layers being discussed, Agricultural Complexes, Transported Landscapes and Historical Records, the tools are the same but the approach is significantly different.

GIS Applications Used

For this project, I used two GIS applications: Google Earth, and Pictometry International's Electronic Field Study. Google Earth was used to house the GIS layers and visualize their relationship to the landscape. It was also used to create some of the GIS layers. Pictometry's Electronic Field Study was used to locate the transported landscapes, and analyze the agricultural complexes.

I used the freely available version of Google Earth, (Google Earth 2010) which, at the time of this paper, is in version 6.0.3.2197. In order to view the Google Earth imagery as clearly as possible, I used a large, high quality monitor in a darkened room. I also increased the resolution of the imagery being delivered from the Google Earth servers, by going into the menu under Tools, Options, and then increased the Terrain Quality to maximum by sliding the selection bar all the way to the right.

Google Earth has pulled together a variety of satellite images to "quilt" together their imagery database. These images have a varying degree of resolution depending on what you are viewing at the moment. Their imagery is delivered from their central servers and is subject to change at any time. The imagery quality available for Kaua'i during the time of this study was sufficient to identify larger trees, but not shrubs and smaller plants such as *ʻŀ*. (But for example, the imagery available for San Jose, California is sufficient to identify shrubs and smaller plants.)

Pictometry International Corporation's Electronic Field Study, version 2.7, Production release 1, Revision 14 (Pictometry 2010) was also used. It's database of 44,000 Geo-referenced images of Kaua'i average 6-inches per pixel, and allow me to systematically survey an *ahupuaʻa*, obtaining coordinates for trees and other objects in the landscape. Using the application, you can also determine the boundaries of an agricultural complex, measure the height of a cliff, and view an area from a variety of different angles. Electronic Field Study was designed for Urban Planners, and the Pictometry staff indicated that this project is the first time they have heard of their application being used for landscape surveys.

GPS Tools Used

A portable GPS unit (Garmin 60 CSX) was used for field visits to record locations of plants and other features. Data from the GPS unit was downloaded into the Garmin Map Source (Garmin 2010)(software version 6.14.1) application, reorganized, and then imported into Google Earth.



Figure 12a. Author's conception of an agricultural complex. Image generated with Google Earth.

Method for Identifying Agricultural Complexes

For the purposes of developing this GIS layer, I have defined an agricultural complex (Figure 12a), as a gently sloping or level area of land along a river or stream, that can be irrigated by an *auwai* (irrigation ditch), and containing remnants of transported landscapes.

To locate agricultural complexes, it is helpful to try and think like an ancient Hawaiian engineer. Handy *et al.* (1991) describe the construction and operation of *auwai*, along with some of the protocols associated with their communal use.

When constructing these new irrigated agricultural complexes, the ancient Hawaiians put considerable work into bringing water in as high as was practicable, maximizing the farmable area. The layout of each complex is different, yet they share some essential elements. Most are sup-



Figure 12b. *Auwai* elevation measurement. Image generated with Google Earth.

plied by a primary *auwai* that uses a dam to pull water from the stream. This water is used to supply the small ditches and *lo'i* that make up the complex.

To locate the ancient agricultural complexes of an *ahupua'a*, I begin at the coast where the river or stream enters the ocean. There are usually some broad flat lands here and a *muliwai* (brackish pond) where the river or stream enters the ocean. As these lands are at the lowest elevation, they are some of the easiest to reach with an *auwai*.

After locating a candidate flatland along the river with Google Earth, I look for evidence of disturbances to the native landscape, including elements of transported landscapes, such as *kukui* trees (*Aleurites moluccana* (L.) Willd.), whose oily nuts

were burned for light. Next, I consult the Electronic Field Study imagery to see if there are any visual indications of the boundary of the complex. In many cases, you can see level, irrigable land running up to the base of a cliff, or to an abrupt bank in the hill.

With a general idea of the complex outline, I then conduct an elevation survey using Google Earth and the Electronic Field Study. In Google Earth, you can determine the elevation of an area by placing the cursor over it. The elevation will be displayed at the bottom of the screen, and change dynamically as you move the cursor around. With this tool, I determine the elevation of the river, just *mauka* (toward the center of Kaua'i) of the complex by moving the cursor from one side of the river to the other, noting the minimum elevation of the water level.

This gives you a beginning elevation for the water intake. Electronic Field Study also has an elevation tool; however, it measures canopy height. Google Earth's elevation tool measures terrain height, which provides a more accurate indication of a potential irrigation intake elevation.

With the intake elevation as a starting point, I use the Google Earth line tool to mark out the boundary of irrigable land, assuming a 2 foot drop for every 100 feet. This line (Figure 12b) provides an idealized view of the primary *auwai*, and marks the boundary of the agricultural complex.

Using Electronic Field Study's Area tool, I measure the complex three times, recording the average in the spreadsheet. In Google Earth, I use the Add Polygon tool to make an outline of the complex, and record the area measurement in the Description field. As the imagery in Google Earth is a little off of alignment, I rely upon elevation to guide drawing the boundaries of the complex. Although this is not as accurate as a ground survey would be, it is sufficient to provide valuable insight into the extent and nature of the ancient agricultural landscape. This process is continued up the **ahupua'a** (Figure 13), following each branch of the river and its streams until the indicators stop.



Figure 13. Agricultural complexes in Lumaha'i ahupua'a, Kaua'i, Hawaiian Islands. Image generated with Google Earth.

Method for conducting aerial surveys of transported landscapes

While I have noticed the indicator plants in the forest for some time, GIS provides the opportunity to record their locations. Pictometry is used to systematically explore an **ahupua'a**, from the valley floor to the top of the ridges (Figure 14), looking for remnants of ancient plantings. Coordinates for each tree or cluster of plants was recorded in Google Earth.

The following plants were included in the surveys: bamboo, bananas, **hau**, mango and **ti**. In order to determine what a plant looks like from the air, I start with one that I have already seen from the ground and take a look at it

with Google Earth and then in Electronic Field Study to determine its aerial signature.

In Google Earth, **kukui** trees are so easily seen, and plentiful, that I don't bother marking them. Some of the other transported landscapes can be glimpsed with Google Earth, but are much more visible in the Electronic Field Study imagery.

Beginning at the ocean, I use Electronic Field Study to systematically inspect the **ahupua'a**, including each of the side drainages, for the transported landscapes previ-



Figure 14. Bananas (*Musa acuminata* x *balbisiana* Colla), **ti** (*Cordyline fruticosa* (L.) A. Chev.) and mangos (*Mangifera indica* L.) in Wainiha ahupua'a, Kaua'i, Hawaiian Islands. Picture courtesy of Pictometry International Corp.

ously listed. As most areas have images available from each direction as well as directly overhead, great care is taken to determine the optimum viewing angle, as lighting can make things appear and disappear.

Once the ideal viewing angle is determined, the area or side drainage is explored from that angle, and the targeted species locations are systematically recorded, each in their own folder, and represented by a custom icon. This process is continued until the entire **ahupua'a** is explored.

Historical Reconciliation using GIS layers

Historical records were consulted for descriptions of ancient or historical agricultural systems. Further place names information was obtained from old maps, and especially from the unpublished manuscripts of Fred Wichman, that are on file at the Kauai Historical Society.

Using Google Earth, Tax Maps were converted into a layer using the Add Image Overlay tool. By temporarily making a Tax Map semi-transparent, I am able to align it with the Google Earth imagery. This is done for all of the Tax Maps

for the **ahupua'a**, and the image overlays are stored in their own folder.

One at a time, each of the Tax Maps is turned on, and any relevant features are traced with Google Earth Polygons or Lines. Hawaiian Land Claim Award parcel outlines, and old irrigation ditches are the main focus. When the Tax Map overlay is turned off, the drawing shapes remain, and each are placed in their appropriate folder.

Land Claim records from the Great Mahele were consulted (Ulukau 2011), and information for each Land Claim was entered under an envelope icon (Figure 15) which was placed in the related parcel outline. This was done for each Land Claim Award in the **ahupua'a**. Place Names mentioned in the Land Claim Awards (Figure 16), but not recorded elsewhere, were located and added to the Google Earth layer.

Results

The GIS layers are all combined to create a master GIS model for an **ahupua'a**. This allows a researcher to eas-

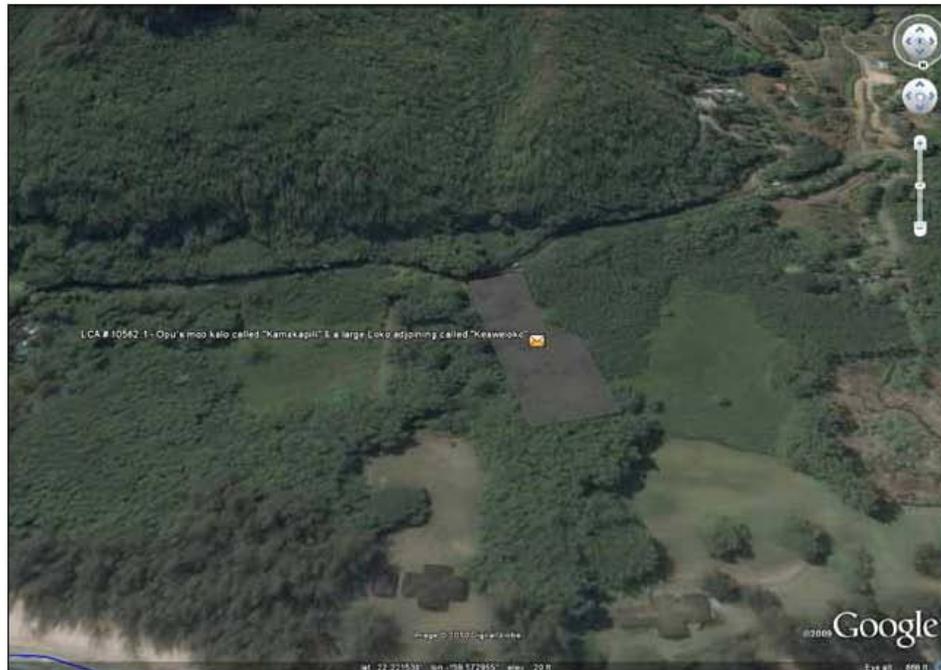


Figure 15. Hawaiian land claim award (LCA #10562.1 - Opu's moo kalo called Kamakapili & a large Loko adjoining called "Keaweloko") outlined in Ha'ena ahupua'a, Kaua'i, Hawaiian Islands. Image generated with Google Earth.



Figure 16 (above). Place names in Ha'ena ahupua'a, Kauai, Hawaiian Islands: **A**) Wa-wai-kapu Pali; **B**) Konohiki's pasture; **C**) Moo Kalo M...; **D**) Sand hills back of beach; **E**) Kawaikapu pali; **F**) Kahau pali; **G**) Moo kalo called Keokeaihu; **H**) Pu'u-o-Ni'ihau; **I**) Pohaku-loa; **J**) Koie; **K**) Loi called Malupo; **L**) School - Grant #41:8; **M**) Aio's lois; **N**) Nakeu's lois; **O**) Kaluahonu; **P**) Lalaole's Koele moo; **Q**) Nuuanu land; **R**) Kalaelehua's lois; **S**) Moo kalo "Peekauai"; **T**) Loi "Koia"; **U**) Maka-hoa; **V**) Lae's land; **W**) Koele "Kapalaa"; **X**) Davida's loi "Pahole"; **Y**) Kilili moo Piimoku's lois; **Z**) Na Anawaiakanaka; **AA**) moo Kapuakaiki/Kapuakabiki; **BB**) Awana's lo'i; **CC**) moo "Kaahaolono"Kunihi's lois. Image generated with Google Earth.

Figure 17 (right). Main GIS model with layers organized into folders. Screen capture from Google Earth.

ily access data for a particular **ahupua'a** (Figure 17) and selectively enable the data to be visualized. By selectively enabling the data layers, a custom view of the ancient agricultural landscape can be created. This allows the data to be viewed from many angles in 3D, revealing things that were previously only understood by people who lived in an area for a lifetime.

A few notes on data accuracy

The **ahupua'a** boundary outlines were obtained from the State of Hawaii GIS website and reflect the state of the boundaries around the time of the Great Mahele (1848). These **ahupua'a** boundaries changed over time with increases or decreases in populations, changing political leadership and other factors. These GIS layers are not considered to be accurate by modern surveyor's standards, but can still serve to help us understand the ancient Hawaiian agricultural environment. The data layers produced from this study are only aerial surveys, detailed ground surveys are required to obtain a truly accurate view of what remains on the ground.



Results are presented for three general classes of layers: agricultural complexes, aerial ethnobotanical surveys for plants from transported landscapes, and historical reconciliation using GIS layers.

Agricultural complexes

Figures 18 and 19 illustrate examples of agricultural complexes from Kaua'i.



Figure 18. Agricultural complexes in Wainiha ahupua'a, Kaua'i, Hawaiian Islands. Image generated with Google Earth.



Figure 19. Agricultural complexes in Lumaha'i ahupua'a, Kaua'i, Hawaiian Islands. Image generated with Google Earth.



Figure 22. Survey results for hau (*Hibiscus tiliaceus* L.) in Ha'ena ahupua'a, Kaua'i, Hawaiian Islands. Image generated with Google Earth.



Figure 23. Survey results for mango trees (*Mangifera indica* L.) in Ha'ena ahupua'a, Kaua'i, Hawaiian Islands. Image generated with Google Earth.



Figure 24. Survey results for Hawaiian *ti* (*Cordyline fruticosa* (L.) A. Chev.) in Ha'ena ahupua'a, Kaua'i, Hawaiian Islands. Image generated with Google Earth.



Figure 25. Historical data, place names and land claim awards in Wainiha ahupua'a, Kaua'i, Hawaiian Islands. Image generated with Google Earth.

Discussion

Many times while doing this work I will get "chicken skin" when working on particularly interesting places, and in these moments I am transported (in my imagination) back in time to when these places were full of people and activity. I can almost see the farmers working in their plots, children jumping into their favorite swimming holes, women pounding out **kapa** (bark cloth), people on the trails bringing mountain products to trade with their family at the seashore, and enjoying special places discovered during a lifetime. To experience these places and not be moved would be unusual. As lovely as these remote places are today in their overgrown state (Figure 28), what wonders there must have been to see during the main times of occupation.

In taking a look at the data produced by these surveys, it is easy to be overwhelmed by a cloud of icons and shapes projected over a moving 3D image of Kauai. GIS tools allow you to turn on these layers individually or all at once and view them from just about any angle. This kind of dynamic visualization can be helpful in developing an un-

derstanding of the layout and spatial relationships of the agricultural landscape.

A discussion follows of each of the three focuses of this study: agricultural complexes, ethnobotanical surveys and historical records.

Agricultural Complexes

The number of agricultural complexes predicted by this GIS model point to a time of large populations. The model is actually a bit conservative, as it does not attempt to account for the many minor taro patches formed in the side drainages seen during my field visits. By outlining all of the main agricultural complexes within an **ahupua'a** (Figures 18, 19), the extent of development begins to take shape. The complexes certainly do form the "slowly ascending stairway of steps, broad in the tread and low in the rise" as mentioned in Handy *et al.* (1991). Google Earth allows you to "fly" up the valley, viewing each complex as it sits in its unique area of riverbed geography. The data from the historical layers coordinate nicely with the terrace areas (Figure 29) in the lower portion of Ha'ena ahupua'a.

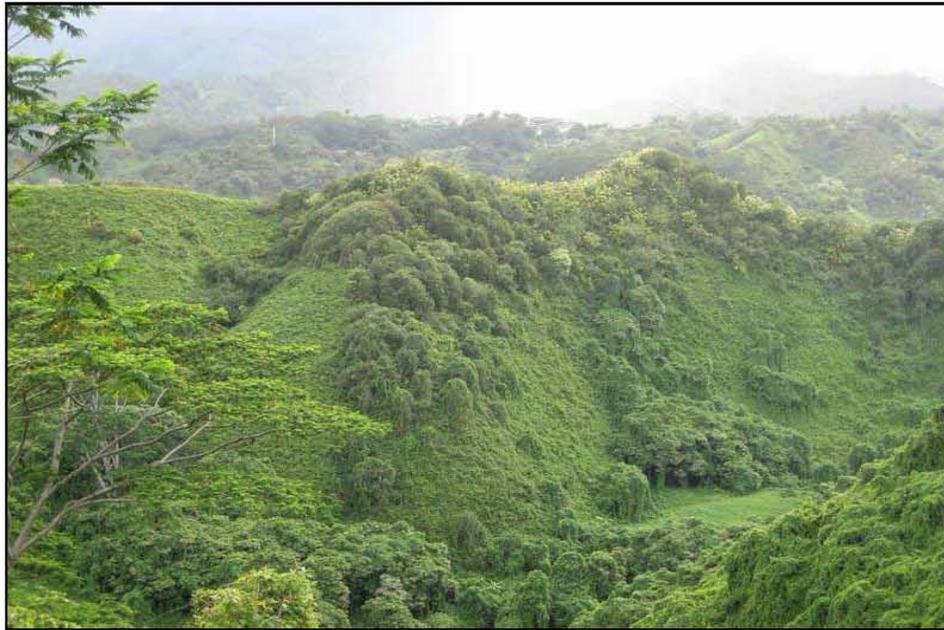


Figure 28. Kawi valley in Wailua ahupua'a, Kauai, Hawaiian Islands. **Ti** (*Cordyline fruticosa* (L.) A. Chev.) covers the twin-peaked hill while **ho'i** (*Dioscorea bulbifera* L.) smothers **mai'a** (*Musa acuminata* x *balbiana* Colla) plants and **kukui** (*Aleurites moluccana* (L.) Willd.) trees. An old agricultural complex is present in the meadow by the stream. Everything you need for a nice upland garden area. Photo by Erik Burton.



Figure 29. Agricultural complexes in Ha'ena ahupua'a, Kaua'i, Hawaiian Islands, with land claim awards and place names layers. Image generated with Google Earth.

With all layers enabled (Figure 27) a view of a very busy ancient agricultural landscape is presented. Primary agricultural complexes by the main river, side drainages filled with **tī**, mango, bananas, **kukui** and hau bush. It is easy to see a group, perhaps a family unit, farming some **lo'i** fed by the main **'auwai** for the agricultural complex as well as utilizing a side drainage for all their forest resources. Instead of heading to the very back of the valley to collect needed forest plants, they simply farmed the nearest side drainage. In the case of a larger drainage, its own side drainages may have been allocated to certain groups or members within the family. On Kaua'i's wet north shore (the area of focused study for this project) most of these side drainages have year round streams and would have been quite productive as evidenced by the quantities of plants remaining (Figure 27).

The agricultural complex prediction maps developed from this study match up nicely with the maps provided by Ladefoged *et al.* (2009) which were based on "climate, hydrology, topography, substrate age, and soil fertility". Neither of our models account for the many minor terraces constructed in the side drainages that I have seen during my hikes. Apparently, just about everywhere conditions were ideal, **lo'i** were constructed and taro was planted.

Aerial surveys for plants from transported landscapes.

This was one of the more interesting sets of layers to create as it had the most direct contact with the people of old

without any human point of view filtering the raw data. The Pictometry package was very helpful as you can easily view the same area from many different viewpoints, using the different lighting conditions to reveal otherwise hidden plants, like **tī** and banana, tucked into ravines and under the tree canopy.

It was surprising to see just how many of these Hawaiian introduced plants were still growing in these drainages. After intensively studying hundreds of pictures, patterns begin to emerge that demonstrate a willful intent indicating human intervention, such as in the case of **tī** plants consistently situated at the very tops of drainages and along ridges.

'ohe

Finding 46 clumps of **'ohe** just in the **ahupua'a** of Lumaha'i was impressive. **'ohe** was used for so many things that it is easy to see why so many clumps were planted - such a useful resource should be close at hand! The groves of thin green **'ohe** (Figure 30) that have eaten up big parts of the side drainages and the valley floor need to be identified. Growing unchecked, they are consuming large areas and erasing possible evidence of ancient planting practices.

What is this thin stalked variety planted in these different areas and what was it used for? Ground truthing these different varieties would provide some interesting data for

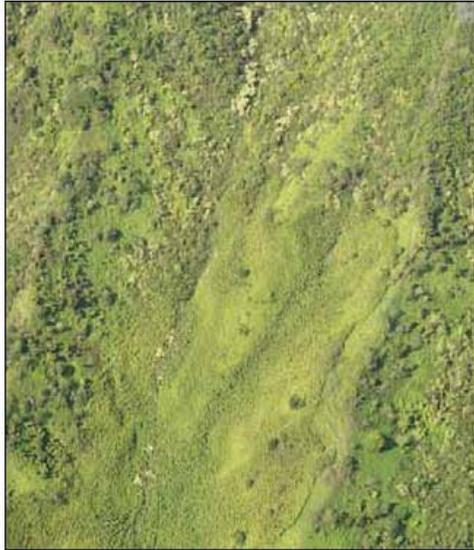


Figure 30. This spreading bamboo in a Wainiha ahupua'a drainage threatens to consume ancient plantings on Kaua'i, Hawaiian Islands. Photo by Erik Burton.

comparing to the descriptions of "Hawaiian bamboo" (Abbott 1992, Handy *et al.* 1991).

Mai'a

What was most notable from the study results for **mai'a**, was the lack of plants considering the other planting activity. During my field visits, I would often find 2 to 3 times as many plants as were visible in the aerial imagery. Many of these others are hidden under the forest canopy or in other inconspicuous areas. Pressures on banana plants that could account for their low numbers include feral pigs who knock the plants down to eat the starchy corms and corm borers. Banana bunchy top virus is established on Kauai but so far seems to be sticking to the coastal areas which are impacted by people.

Identifying which varieties are planted in these areas could provide insight into their intended purpose. Certain plant cultivars had symbolic importance to the ancient Hawaiians and were sometimes planted for what they represented (Abbott 1992) instead of for food or utility purposes.

Hau

Ever since the Hawaiians stopped living in the old ways, **hau** has been on the run with nobody to check its growth (Figure 31). Usually a much trimmed clump near the side



Figure 31. Hau (*Hibiscus tiliaceus* L.) smothering kukui (*Aleurites moluccana* (L.) Willd.) trees on Kaua'i, Hawaiian Islands. Photo courtesy of Pictometry International.

of a river (Handy *et al.* 1991), **hau** is now left alone to grow (Figure 32) out of control. Although it is not currently considered an invasive species, it is probably just a matter of time.

The groves identified from the GIS surveys extend far inland and closely track the agricultural complexes identified in the surveys. This is especially true in Lumaha'i where they cover almost every agricultural complex (Figure 33) extending into the furthest upland reaches of the **ahupua'a**.

Mango Trees

The data from the surveys show mango trees planted primarily in the lower parts of the valley where the majority of Land Claims were awarded (Figure 34). As mango trees were introduced with the coming of Westerners, perhaps this grouping of trees in the lower valley reflects the greatly reduced populations that had moved down to prime lands in the lower valley.

Locally these mangos are referred to as the "common mango", they all seem to flower around the same time (January-March) and can primarily be found near old habitation sites near the coast. I would expect that ground truthing would show the bulk of these trees to be the same variety with just a few near the coast being other cultivars planted in more recent times. As it stands now, the fruit of many of these trees are still harvested and enjoyed by locals and visitors alike as they grace many a park trail (Figure 35).



Figure 32. Hau (*Hibiscus tiliaceus* L.) covering an agricultural complex in Lumaha'i ahupua'a, Kaua'i, Hawaiian Islands. Photo courtesy of Pictometry International.

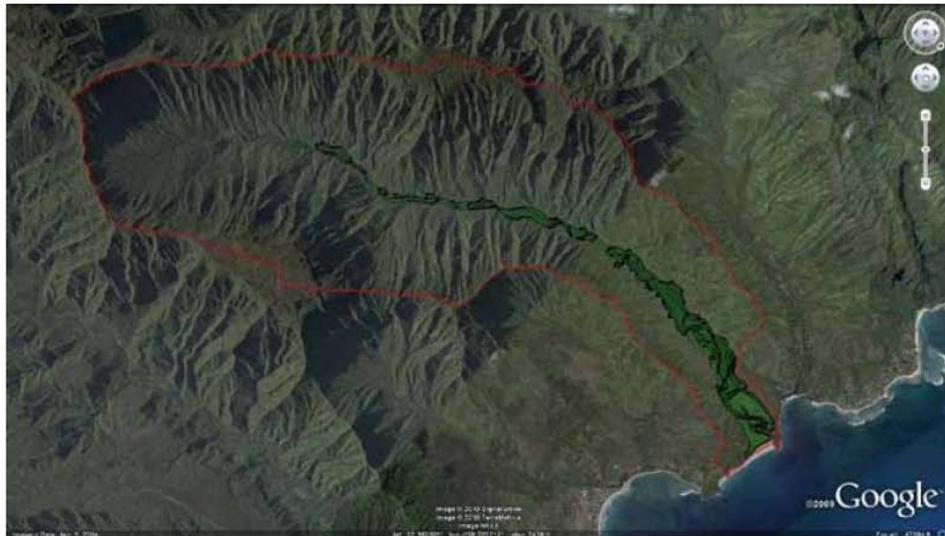


Figure 33. Hau (*Hibiscus tiliaceus* L.) in dark green and agricultural complexes in light green show the close association between the two in Lumaha'i ahupua'a, Kaua'i, Hawaiian Islands. Image generated with Google Earth.

Most of these trees are now over 150 years old and have developed large trunks and high canopies. It can be a bit frightening hiking in old mango groves when the ripe fruit are falling silently from great heights. Although not as big and dangerous as a falling coconut, you still don't want to have one bonk you on the head.

Hawaiian **ti**

ti is the most populous of the plants mapped in these surveys. After intensively studying hundreds of high resolution photos of side drainages filled with Hawaiian introduced plants, I am left marveling most at the **ti**. For exam-

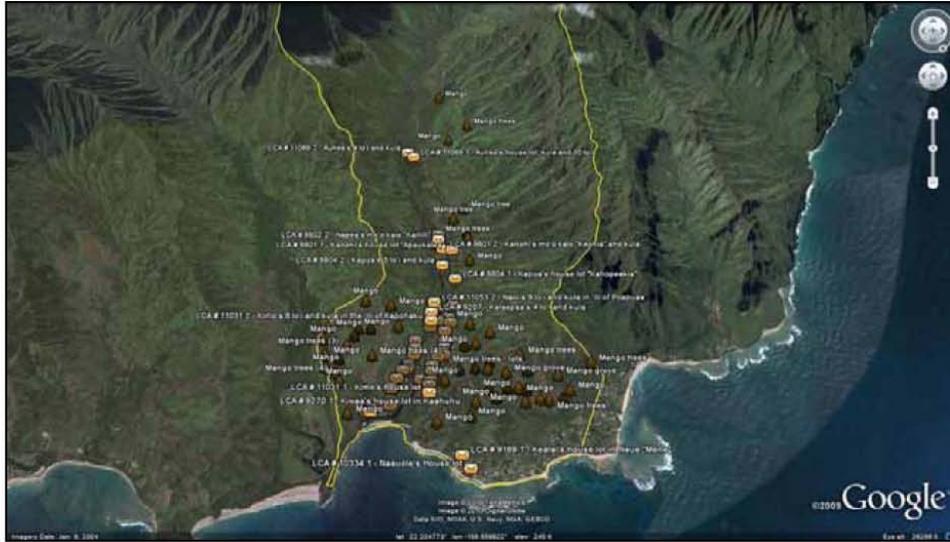


Figure 34. Mango trees (*Mangifera indica* L.) and land claim awards in lower Wainiha ahupua'a, Kaua'i, Hawaiian Islands. Image generated with Google Earth.



Figure 35. Mature mango trees (*Mangifera indica* L.) line a section of old road in laim awards in lower Wailua, Kaua'i, Hawaiian Islands. Photo by Erik Burton.

ple, some side drainages had a few *tī* plants in the lower and mid sections yet had remarkable concentrations of them right near the very top including a few planted right at the highest point (Figure 36). The pattern varies with some side drainages having very few *tī* plants and some that have a few at the very top with no dense concentrations.

The plantings seem to follow a very conscious pattern and are often grouped with other Hawaiian introduced plants like *kukui* trees, bamboo (Figure 37) and bananas.

When considering the *tī* plant's presence in these patterns, I had difficulty coming to terms with the possibility that each and every plant was put there by humans and is still growing exactly where it was planted. Perhaps it is just Mother Nature and her violent storms that have uprooted *tī* plants, broken them into little bits and scattered them in tight groups at the tops of drainages where they sprout and form the plants we see today? If it was Mother Nature doing this, I would expect to see a more general disbursement and not tight groupings of plants in a predictable pattern. There are more examples on Kaua'i of intentionally planted groups of *tī* in unusual places. An example is Figure 28, showing two peaks and the saddle between covered in *tī*. In upper Wailua ahupua'a is a ridge (Figure 38) with a large patch overlooking an overgrown agricultural complex. During my hikes in the field, I have found *tī* marking old trails and planted on sheer rocky cliffs (Figure 39) next to waterfalls. If these *tī* plants



Figure 36. Ti (*Cordyline fruticosa* (L.) A. Chev.) plantings show up with dying yellow leaves at the top of a drainage in Lumaha'i ahupua'a scattered among kukui trees (*Aleurites moluccana* (L.) Willd.), Kaua'i, Hawaiian Islands. Image generated with Google Earth.



Figure 37. Side drainages in Wainiha, Kaua'i, Hawaiian Islands, planted with ti (*Cordyline fruticosa* (L.) A. Chev.) bananas (*Musa acuminata* x *balbisiana* Colla), kukui (*Aleurites moluccana* (L.) Willd.), mangos (*Mangifera indica* L.) and bamboo. Image generated with Google Earth.

were not planted by Mother Nature but instead were put there by a human hand, what was their purpose?

Assuming, as Bennett (1931) says, just as they did not build houses on land that could be used for taro production, the large populations of old must have had kula lands elsewhere for planting the other plants needed for everyday life. In looking at the geography around the agricultural terraces, the only other land is the side drainages where all the Hawaiian introduced plants were found! Supposing that these drainages (Figure 29c) were the kula lands for people during the ancient times of high populations, how were they apportioned?

Agricultural activity greatly benefits from the presence of water and most of these side drainages have perennial streams. Considering how methodical the Hawaiians were in dividing up other lands, it seems logical that individual side drainages would be worked by a specific group of people, perhaps an extended family or working group. If this was the case,



Figure 38. *Ti* (*Condyline fruticosa* (L.) A. Chev.) plants cover part of a ridge in Wailua ahupua'a, Kaua'i, Hawaiian Islands. Photo by Erik Rohlfes.

the plantings up in the higher parts of the drainage could be accounted for in several ways.

Perhaps population pressures justified planting all parts of the drainage and as populations declined, later generations harvested the easier to reach plants, not replanting as there was so much to pull from.

Another possibility that comes to mind is the spiritual role of *ti* in accompanying prayers and sanctifying an area (Abbott 1992). Is it possible that each year, a *ti* plant was taken to the top of the drainage and planted as part of a prayer to the gods for successful harvests that year? After many years the plants would accumulate at the top of the drainage with a few especially brave souls taking their plant(s) to the uppermost reachable part of the drainage, getting it that much closer to the gods. This idea does account for this planting pattern being present in the minor drainages that lack prodigious quantities of *ti* but still have a few strategically placed plants at the very top. Some of the large drainages have several (Figure 40) branches that are themselves quite large and have *ti* going to their

tops. Could these also have been held by separate family groups and represent their individual prayers?

Another idea is that these plants could have been planted to demonstrate bravery. A flag rots over time whereas a *ti* plant is both long lasting and easy to see.

If you consider the ancient lifestyle pattern of living near your taro patch and periodically heading up into the mountains to tend your gardens and collect forest resources, it would have been quite a monumental trek for these people to have to proceed to the upper valley of the larger *ahupua'a* like Wainiha which is twelve miles long. Heading up the side drainages for these resources would have been much more convenient.

Considering that *ti* was used for so many things, including just about every spiritual function, and that it needs human intervention to create new plantings, further research could provide some interesting insights into ancient agricultural practices.



Figure 39. *Ti* (*Cordyline fruticosa* (L.) A. Chev.) planted on sheer rocky cliffs next to a waterfall in Makaleha, Kaua'i, Hawaiian Islands. For scale, the top of the falls is about 60 feet up from the stream bed. Photo by Erik Burton.

Historical Reconciliation using GIS layers

Working with these GIS layers was very interesting as a number of the identified agricultural complexes situated in the lower parts of the valley had names preserved during the Great Mahele. Some of these from the finished historical data layer are described as follows:

One interesting example is the very long (Figure 41) agricultural complex that runs along Powerhouse road in lower Wainiha. From the Kauai Historical Society's collection of place names (Fred Wichman) comes the name Ka-pa-loa, the long fence or alternatively Ka-pa-lo'i, the elongated food bowl. Considering the shape of the agricultural complex, my bet is on the name Ka-pa-lo'i as the complex is certainly elongated and would have produced much taro.

The names of a few side drainages emerged from the Land Claim documents that do not appear on the old



Figure 40. *Ti* (*Cordyline fruticosa* (L.) A. Chev.) and *ku-kui* (*Aleurites moluccana* (L.) Willd.) plants in branching drainages in lower Wainiha ahupua'a, Kaua'i, Hawaiian Islands. Photo courtesy of Pictometry International Corp.

maps. One example of a drainage name is: 'a'kahi, place of food (Figure 42). Some tidbits from the Land Claim Award testimonies reveal interesting things about daily life at the time of the Great Mahele including that orange trees were a much valued asset as they could be sold to California buyers – one of the few cash crops for individual farmers at the time. The Land Claim records detail several battles with the **konohiki** of the **ahupua'a** who is trying to claim the trees of one of the inhabitants. These were no laughing matters. Shortly after the Great Mahele process was completed, **konohiki** lost their jobs and many had to depend on the charity of their former charges.

Names of individual taro patches, groups of patches and agricultural complexes came out of the Land Claim Awards and were able to be generally located on the map – many of these not appearing on any other maps such as names for side streams, pasture lands, cliffs and minor irrigation ditches.

Conclusions

At the beginning of this paper I posed three objectives and will now address if they were achieved and what was learned.



Figure 41. Ka-pa-loa, the long fence; or alternatively, ka-pa-lo'i, the elongated food bowl. An agricultural complex in lower Wainiha ahupua'a, Kaua'i, Hawaiian Islands. Image generated with Google Earth.

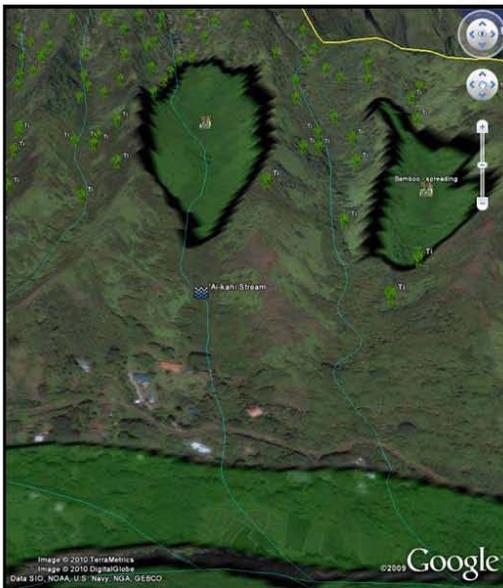


Figure 42. Ka-pa-loa, the long fence; or alternatively, ka-pa-lo'i, the elongated food bowl. An agricultural complex in lower Wainiha ahupua'a, Kaua'i, Hawaiian Islands. Image generated with Google Earth.

1. Develop a GIS model to predict the location and extent of Agricultural Complexes within an ahupua'a.

Based on my hikes to a sample of the predicted areas, the model for agricultural complexes is preliminarily accurate and the resulting GIS model can be used to predict the presence of abandoned agricultural complexes. The outlining of all of these complexes to the most inland extent of the ahupua'a provide a good idea of how far inland an ahupua'a was developed for agricultural production.

Note: When Pictometry completes imaging the island of Kaua'i, agricultural complex area measurements can be completed for each ahupua'a on Kaua'i.

2. Conduct a GIS based aerial survey of an ahupua'a detailing the location of plants from transported landscapes.

The plant surveys are labor intensive but provide a fantastic view of ancient Hawaiian planting practices that is otherwise unavailable. These side drainages were an important source of the valuable materials needed for everyday life. Being able to view these detailed plant surveys with the other layers provides a valuable view of the ancient agricultural landscape of an ahupua'a.

3. Develop a GIS model of information from the historical archives that can be used to compare with the results from Objectives 1 & 2.

The confusing amount of information contained in the old records was much easier to understand once it was rendered into GIS layers and viewed with the other layers. Names of individual **lo'i**, **'auwai**, **loko** (fishponds) and **kula** lands began matching up with features identified

in the other layers. Combining these layers and viewing them in a 3D terrain model (Google Earth) helps an overall picture of ancient land use patterns (Figure 43) begins to emerge.

These new layers were added to my master GIS model (Figure 44) which consists of a variety of other layers shedding light on ancient Kaua'i.



Figure 43. All layers for Ha'ena ahupua'a, Kaua'i, Hawaiian Islands. Image generated with Google Earth.

Acknowledgements

I would like to recognize the Hawaiian people for their achievements in maximizing sustainable agriculture in a variety of environments and conditions. We have much to learn from the people of old and their descendents.

Randy Wichman provided countless hours of consulting and direction to help improve my understanding of Kaua'i's ancient cultural landscape. His personal knowledge of ancient Kaua'i is not only singularly remarkable, his willingness to share and open demeanor suite him well for his role in leading the Kauai Historical Society.

My thanks also go out to Angela Kepler and Frank Rust for inspiring me about the wonderful group of bananas found in Hawai'i and their potential to tell us about the past. Her pictures of wild banana plants and old mountain gardens inspired me.

Kawika Winter provided invaluable advice and insights into plants, planting practices and help with what is **pono**.

He is a remarkably tolerant and patient sounding board for my crazy ideas.

Will McClatchey encouraged me to write this paper. "A scientist is somebody who shares information". Not only is his level of knowledge and passion for the subject remarkable, his enthusiasm is infectious.

Fred Wichman's wonderful books of Kaua'i legends were my initial inspiration to begin GIS mapping of ancient Kaua'i. His unpublished masterwork of Kaua'i place names kept at the Kauai Historical Society is an amazing resource for anybody interested in ancient Kaua'i.

My sincere thanks to those who hike Kaua'i's remote interior and share amazing photos with me, their contributions have materially contributed to this project.

My gratitude also goes out to all those who have collected and preserved the fragments of Hawaiian history that we do have.

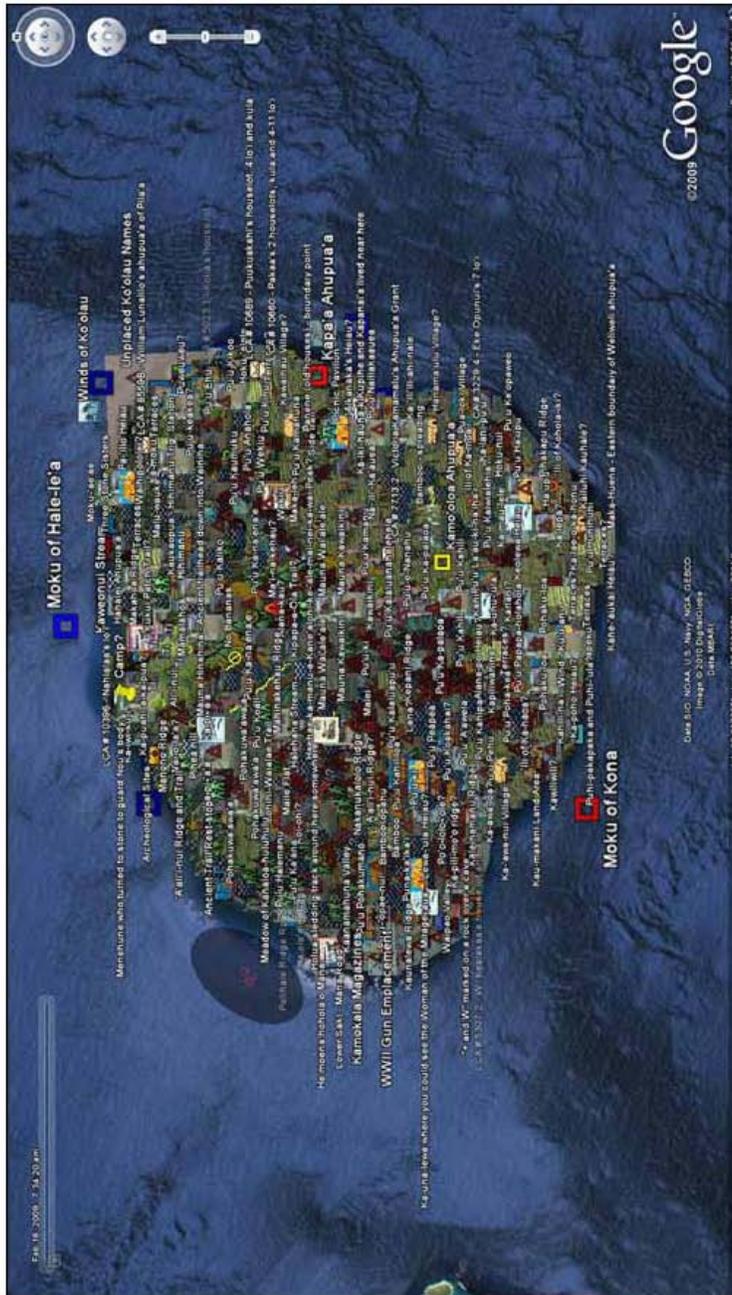


Figure 44. Ancient Kauai i Mapping Project - all layers. Image generated with Google Earth.

www.ethnobotanyjournal.org/vol9/i1/547-3465-09-349.pdf

Literature Cited

- Abbott, I.A. 1992. *La'au Hawai'i, Traditional Hawaiian uses of plants*. B.P. Bishop Museum Press, Honolulu, Hawai'i.
- Bennett, W.C. 1931. *Archeology of Kauai Bishop Museum Press*. B.P. Bishop Museum Press, Honolulu, Hawai'i. <http://hbs.bishopmuseum.org/pubs-online/pdf/bull80.pdf>
- Bunchy top. 2006. *Banana Bunchy Top Disease in Hawaii*. College of Tropical Agriculture and Human Resources, University of Hawai'i at Manoa, Honolulu, Hawai'i. www.ctahr.hawaii.edu/banana/
- Fornander, A. 1916-1917. *Ancient History of the Hawaiian People*. Volume 4. Mutual Publishing, Honolulu, Hawai'i.
- Garmin. 2010. *Garmin International, Inc.* Olathe, Kansas. www.garmin.com
- Google Earth. 2010. *Google Earth*. Google Inc. Mountain View, California. www.earth.google.com
- Handy, E.S.C. 1940. The Hawaiian planter: His plants, methods and areas of cultivation. Volume 1. *Bernice P. Bishop Museum Bulletin* 161:1-227.
- Handy, E.S.C., E.G. Handy & M.K. Pukui. 1991. *Native Planters in old Hawaii: Their life, lore, and environment*. Bishop Museum Press, Honolulu, Hawai'i.
- Kamakau, S.M. 1992. *Ruling Chiefs of Hawaii*. Revised edition. Kamehameha Schools Press. Honolulu, Hawai'i.
- KHS. 2009. *Kauai Historical Society*. Lihue, Hawai'i. www.kauaihistoricalsociety.org
- Kepler, A.K. 1998. *Hawaiian Heritage Plants*. University of Hawai'i Press, Honolulu, Hawai'i.
- Kepler, A.K. 2008. Personal communications.
- Kirch, P.V. & J. Rallu. 2007. Editors of *The Growth and Collapse of Pacific Island Societies*. University of Hawai'i Press, Honolulu, Hawai'i.
- Ladefoged, T.N., P.V. Kirch, S.M. Gon III, O.A. Chadwick, A.S. Hartshorn & P.M. Vitousek. 2009. Opportunities and constraints for intensive agriculture in the Hawaiian archipelago prior to European contact. *Journal of Archaeological Science* 36:2374-2383.
- Lundstrom, L. 2010. Personal communications. Hawaii Chapter of the American Bamboo Society.
- McClatchey, W. 2010. Personal communications. UH Manoa Botany Department. Manoa, Hawai'i.
- Moffat, R.M. & G.L. Fitzpatrick. 1995. *Surveying the Mahele: Mapping the Hawaiian land revolution*. Editions Limited, Honolulu, Hawai'i.
- Morton, J. F. 1987. *Fruits of Warm Climates*. Julia F. Morton, Miami, Florida.
- Pictometry. 2010. *Pictometry International Corporation. Electronic Field Study*. Version 2.7, production release 1, Revision 14. Rochester, New York. www.pictometry.com
- Ramage, C.S. & T.A. Schroeder. 1999. *Trade Wind Rainfall atop Mount Wai'ale'ale, Kauai*. School of Ocean and Earth Science and Technology Contribution, Number 474., September, 1999. Department of Meteorology, School of Ocean and Earth Sciences, University of Hawaii at Manoa, Honolulu, Hawai'i.
- Rumsey, D. 2009. *David Rumsey Map Collection*. Cartography Associates. www.davidrumsey.com. (accessed 2008-2009)
- The State of Hawai'i Data Book. 2004. <http://hawaii.gov/dbedt/info/economic/databook/db2004/section06.pdf>
- Ulukau. 2011. *Ulukau: The Hawaiian Electronic Library*. College of Hawaiian Language and Native Hawaiian Library, Alu Like, Inc. www.ulukau.org
- White, L.D. 2003. *Canoe Plants of Ancient Hawaii*. www.canoeplants.com
- Wichman, F. n.d. *Kauai Place Names*. Unpublished manuscript stored at the Kaua'i Historical Society. Lihue, Hawai'i. www.kauaihistoricalsociety.org
- Yen, D.E. 1987. The Hawaiian ti plant (*Cordyline fruticosa* L.): Some ethnobotanical notes. *Notes from Waimea Arboretum and Botanical Garden* 14(1):8-11.

Subject: RE: Puu Opae Bridge, Opaekaa Bridge, and Kapahi Bridge
From: Erik Burton (eburton@restorekauai.org)
To: catdagher@yahoo.com;
Date: Saturday, March 3, 2012 6:27 AM

Aloha Cathleen,

My reply did not go through, so I am trying again.

As to the Puu 'Opae and 'Opaeka'a bridge areas, I have found no specific written accounts of that area, other than general reports of a lushly farmed upland. The ali'i did have several sacred bathing ponds, and there are a number of sacred sites (and some scary ones) in the Wailua area – many not with state site numbers. After the industrial ag. period, much of the area was scraped clean. The gullies and river flatlands are mostly preserved.

The agricultural complexes for Wailua Ahupua'a continue all the way to the base of Wai'ale'ale, where the village of Ka'uhau protects the lua trail up to the Alakai. Considering that Wailua was so developed, and looking at the lay of the land in these areas, my predictive model indicates that there were lo'i all along the 'opaeka'a stream. With Wailua's peak population pushing all the way to the base of Wai'ale'ale, they surely cultivated these easy to access and irrigate, gently sloping uplands. We are only at about 370' elevation, so the growing climate here is good for many things.

Attached is a copy of my paper describing the predictive model.

If you need somebody on Kauai to do some outreach work to the local Hawaiian community, our non-profit (Restore Kauai) was created and led by a Hawaiian man from Anahola. One of our kuleana is to help with land-use issues, and to help ensure that what is left is left alone. We have looked, and continue to look, at each ahupua'a as a system, and to understand how it worked at peak population.

Malama pono,

Erik Burton

Operations Director

<http://us.mg4.mail.yahoo.com/neo/launch>

3/5/2012



[Print](#)

Subject: Opaeka'a and Pu'uopae Bridges
From: Larry LaSota <larryonkauai@gmail.com>
Sent: Friday, February 17, 2012 5:25:26 PM
To: cathy@scshawaii.com

I live between the Opaeka'a and Pu'uopae bridges in Wailua Homesteads. Please, if for no other reason than that the one lane system helps to slow down traffic, they should be saved. Same is true for the Kamalu Rd. in the homesteads. These bridges are perfect the way they are (one lane) and should be kept that way.

Just look what has happened in Kilauea where the Kolo Rd bridge was turned from one into two lanes and now everyone now flies by. Please, leave these bridges as one lane. Don't let the slower pace and character of the neighborhood get turned into a speed zone

--

Larry LaSota
larryonkauai@gmail.com

<http://webmail.scshawaii.com/webmail/driver?nimlet=showcanvas> 2/17/2012

747 Main Street B-2
Osterville, MA 02655
January 3, 2012

Mr. Larry Dill, County Engineer
Department of Public Works
County of Kauai
4444 Rice Street
Lihue, HI 96766

Opaekaa Bridge

Dear Mr. Dill,

Nearly thirty-five years ago, Donald Jackson and I published the research article, "Kauai's Opaekaa Bridge: The Only Known British Truss Bridge in the United States," examining the bridge physically and describing it historically. Jackson was on the staff of the Historic American Engineering Record (HAER), and I was Director of Grove Farm museum and a professional historian.

For the first time, in 1978, the Opaekaa Bridge was recognized as historically significant in Hawaii; moreover, the bridge was identified nationally as the only British-made iron bridge in America. I can recall Pila Kikuchi, the Kauai archeologist and a member of the State Historical Preservation Board, telling me that he never had known of the bridge's importance in American industrial archaeology until he read my article.

Twenty years ago, I participated in meetings of the County Public Works Department staff, and its engineering consultants from Honolulu and the Mainland, who considered the Opaekaa Bridge worthy of repair and who developed several plans for its rehabilitation and preservation.

No action was taken by the County on those recommendations, I understand. It is hard to be forgiving about the County's neglect and

lack of care since 1992; I can only hope that the present comprehensive review of the future of the bridge by the County and State will produce a preservation rehabilitation plan for stabilization—and continued practical use—of this surviving historical structure on Kauai.

Sincerely,

Barnes Riznik
Director Emeritus
Grove Farm Museum

The Honorable Bernard Carvalho
Mayor of the County of Kauai
4444 Rice Street, Suite 235
Lihue, HI 96766

✓ Cathleen Dagher, Senior Archeologist
Scientific Consultant Services, Inc.
711 Kapiolani Blvd., Suite 975
Honolulu, HI 96813

Mike Hunneman, Vice President
Kai Hawaii, Inc.
31 N. Pauahi St. 2nd Floor Attn: Tonia Moy, Fung Associates
Honolulu, HI 96817

Kauai Historic Preservation Commission
Kauai Planning Department
4444 Rice Street,
Lihue, HI 96766

Robert Schleck, Director
Grove Farm Museum



[Print](#)

Subject: **FW:**

From: **Bob Spear** <bob@scshawaii.com>

Sent: **Wednesday, February 08, 2012 5:29:36 PM**

To: cathy@scshawaii.com

-----Original Message-----

From: mfreeman5@hawaii.rr.com [<mailto:mfreeman5@hawaii.rr.com>]

Sent: Wednesday, February 08, 2012 2:25 PM

To: scs@scshawaii.com

Subject:

To: Scientific Consultant Services
@ scs@scshawaii.com

From:
Margery Freeman
6448 Kaahale St.
Kapaa, HI 96746
(808)822-4605

Subject: Cultural Impact Assessment.

Ms. Cathleen Dagher,

The Three bridges that are covered by this assessment are near my home on Kauai. There are a number of reasons these bridges should be kept as one lane bridges.

- 1) They are historic
 - 2) They slow down traffic
 - 3) They are safer than having people rush around on wide streets
- The studies of their accidents are misleading. Most of those problems happened a mile or two

<http://webmail.scshawaii.com/webmail/driver?nimlet=showcanvas> 2/8/2012

away from the bridge so are NOT relevant to the bridge.

4) There is very little traffic on any of them

5) They contribute to keeping our rural life style which is VERY important to us.

6) Especially the Opaekaa bridge is attractive and interesting because of its look and its historic past.

Please strengthen these 3 bridges and keep them one lane.

Sincerely,
Margery Freeman



STATE OF HAWAII
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAII 96813

February 1, 2012

HRD11/6055

Cathleen Dagher, Senior Archaeologist
Scientific Consultant Services, Inc.
711 Kapi'olani Boulevard, Suite 975
Honolulu, Hawai'i 96813

**Re: Pre-Cultural Impact Assessment Consultation
Bridge Replacements
Island of Kaua'i**

Aloha e Cathleen Dagher,

The Office of Hawaiian Affairs (OHA) is in receipt of your December 12, 2011 and January 3, 2012 letters requesting comments ahead of a cultural impact assessment (CIA) which will be prepared to support the replacement of three existing bridges (the project) on the Island of Kaua'i: Pu'u 'Ōpae Bridge, 'Ōpaeka'a Bridge and the Kapahi Bridge (bridges).

The statement in your letter *that archaeological reports of studies conducted in the areas of these bridges can be found on file at the State Historic Preservation Division (SHPD) Office* seems to imply that it is our responsibility to go to the SHPD office to review these reports to determine whether there are historic properties of significance to the Hawaiian people identified within the project. If this is indeed what you are suggesting, OHA finds this to be unacceptable. In traditional Hawaiian thinking, archaeological resources are cultural resources and thus, we believe it is your responsibility to provide a summary of identified cultural sites within or in the vicinity of the project area to consulting parties.

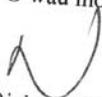
The reference in your letter to applicability of the requirements of the National Environmental Policy Act (NEPA) indicates that there is a federal nexus to this project and we request specific clarification what this federal nexus is. If the requirements of the NEPA are applicable to this project, then we would expect that the requirements of the National Historic Preservation Act (NHPA) are also applicable. Section 106 of the NHPA requires that the "lead federal agency" initiate consultation with interested parties, including Native Hawaiian Organizations and that a "good faith effort" to identify historic properties within the project area be completed.¹ Our ability to assess whether such a "good faith effort" has indeed been completed is dependant on the information within the "archaeological reports" on file with the SHPD being summarized and provided to OHA and other consulting parties.

¹ See NHPA implementing regulations 36 CFR §800.2-4.

If U.S. Department of Transportation involvement in this project provides the federal nexus and "trigger" for applicable federal statutes and regulations, then the requirements of the U.S. Department of Transportation Act, including a Section 4(f) evaluation will also be applicable. We note that your letter confirms that the Pu'u 'Ōpae Bridge and 'Ōpaeka'a Bridge are both listed on the National Register of Historic Places (NRHP). While OHA does not assign significance to these NHRP listed historic properties, we do encourage you to initiate consultation with organizations that do.

Thank you for the opportunity to provide comments at this early stage. We look forward to receiving our requested clarifications. Should you have any questions or concerns, please contact Keola Lindsey at 594-0244 or keolal@oha.org.

'O wau iho nō me ka 'oia'i'o,



Richard Pezzulo
Interim Chief Executive Officer

RP:kl

C: OHA, Kaua'i Community Outreach Coordinator